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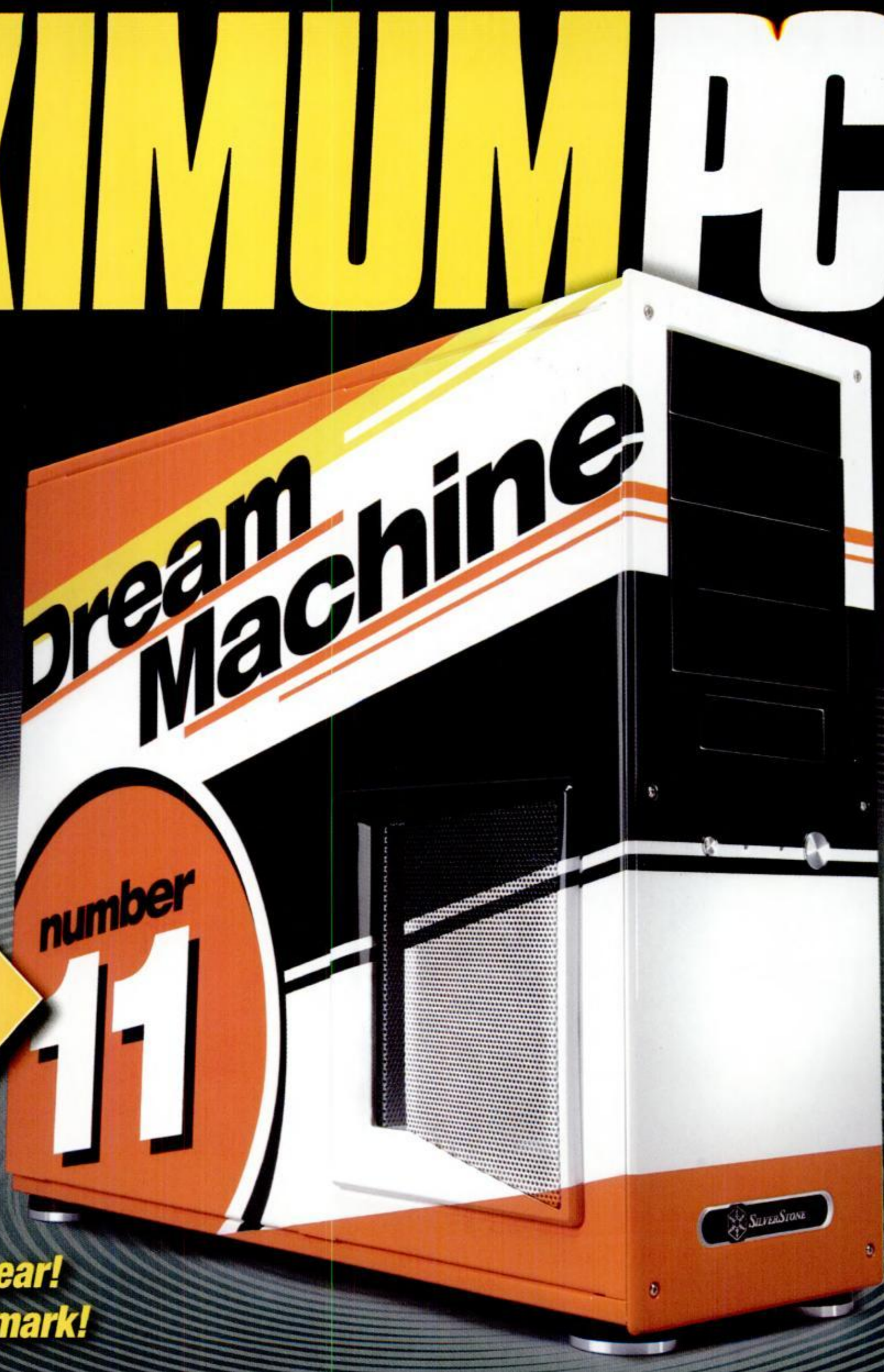

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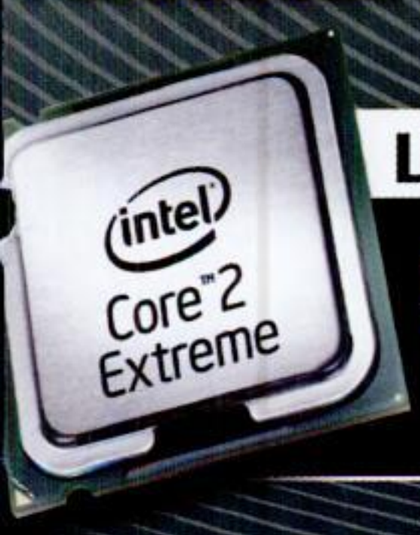

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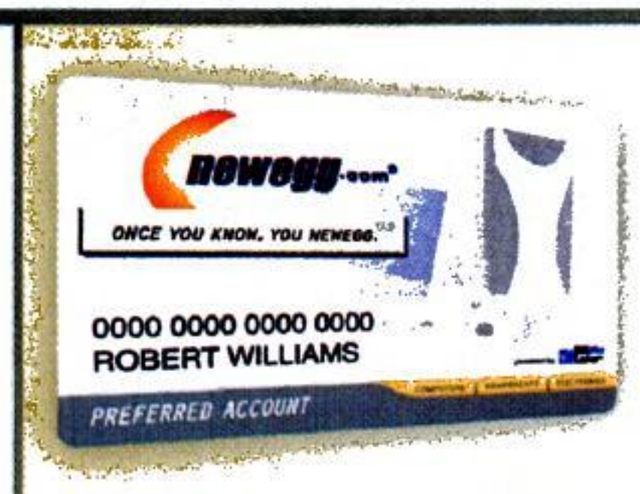

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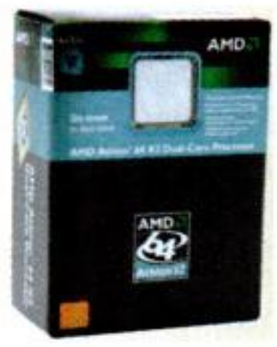

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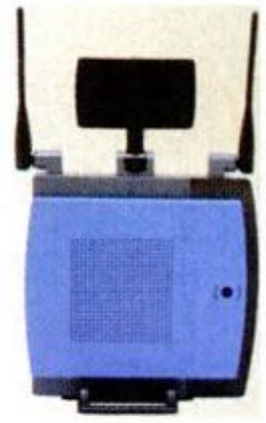

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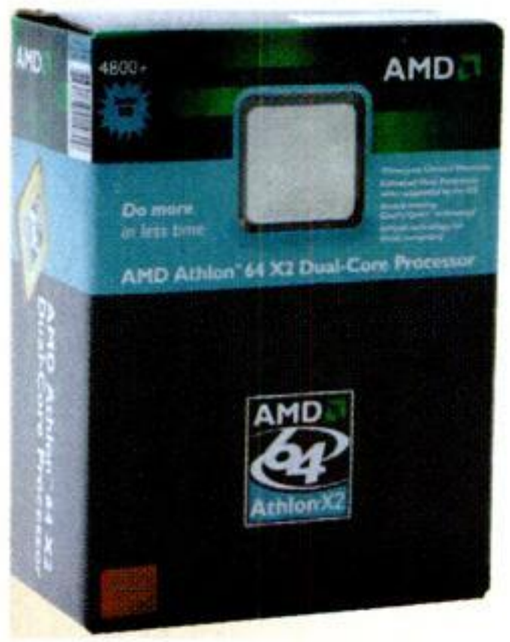

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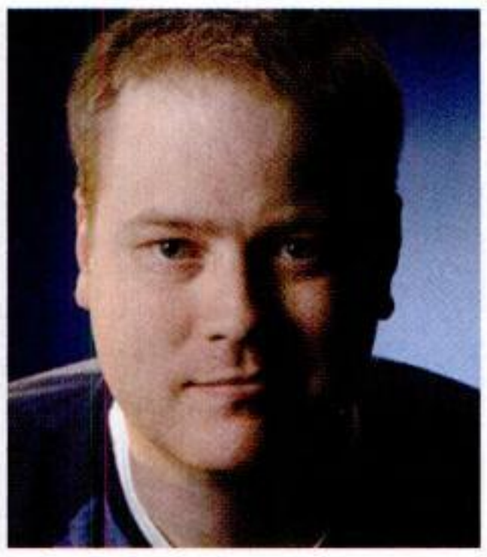

It's Time to Bid Backward-Compatibility Adieu

Please send feedback and sugar cookies to ***will@maximumpc.com***

I hear a lot about backward-compatibility: Windows XP can run apps that are more than 10 years old without problems, and Vista will include much the same functionality. But is this level of backward-compatibility really necessary anymore? When was the last time you ran a non-game app that came out in the last millennium, much less 1995?

The oldest app I regularly run is *Office 10*, and that's just on my aged laptop, which I haven't bothered to upgrade to *OpenOffice*. *Office 10* shipped in 2001. I don't have any reason to run apps more than three or four years old, and I'd bet that most home users are in a similar situation.

I do occasionally play older games, such as *TIE Fighter*, but I've had a ton of success playing my old DOS games using the *Dosbox* emulator. When legacy DirectX support is completely removed from Windows, I'd bet that an emulator for old Windows games, similar to *Dosbox*, will be developed in no time.

What about those "mission-critical enterprise apps" that we always hear about? That's right, I'm talking to you, Mr. DOS-Database-That-The-Company-Can't-Live-Without. Many companies are converting these critical applications into server-based web applications, which will work in any browser, are automatically backed up, and will continue running even if your client machine goes down. It's time to get rid of all those ancient DOS apps!

A massive effort went into making Vista work properly with legacy apps written by folks who flouted Microsoft's development guidelines. Those legacy apps save settings and files to verboten directories. If Microsoft had the chutzpah to eliminate support for legacy apps that misbehave, it could have devoted development resources to more beneficial tasks—like improving Vista's end-user experience.

Five years. That's the magic number. There's no way in hell I'm going to be running the same hardware in five years. Please, Microsoft! Ditch your overzealous backward-compatibility rules, for all our sakes!

On an unrelated note, I want to let you all know about Showdown, the first ever *Maximum PC* LAN party. We're sponsoring Showdown with our sister mag *PC Gamer*, and it's coming up fast! We'll be in San Jose, California, on August 25, 26, and 27. In addition to a 500-person, 24-hour-a-day "Bring Your Own Computer" LAN party, we'll also have a ton of new games, hardware clinics, and other fun activities. For more info, check out **www.showdownlan.com**.

Hope to see you there!

Will Smith

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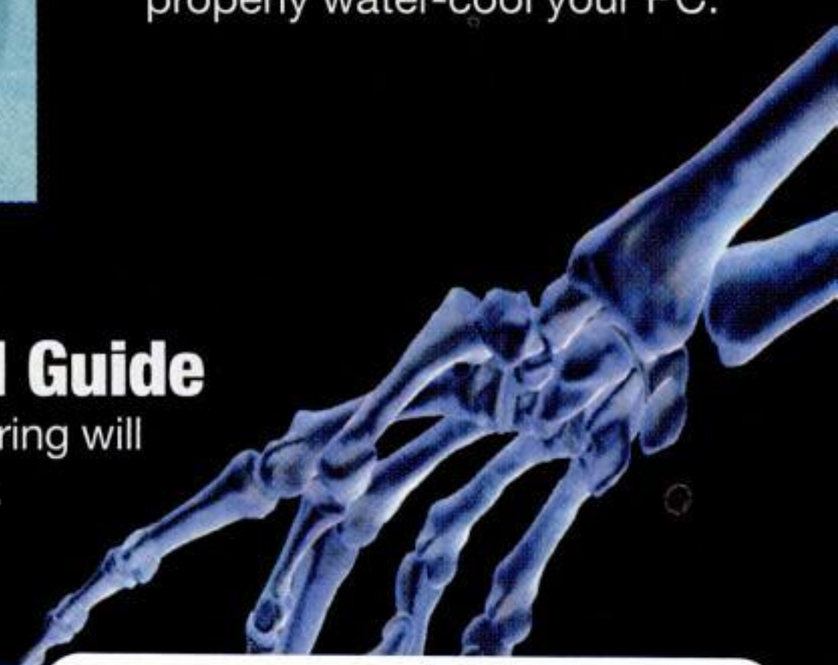

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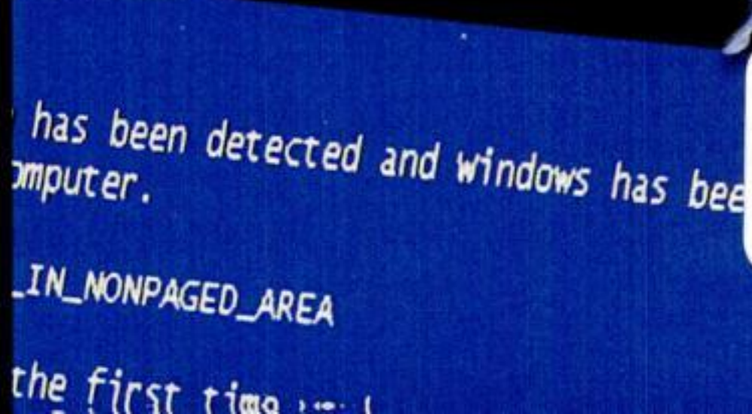

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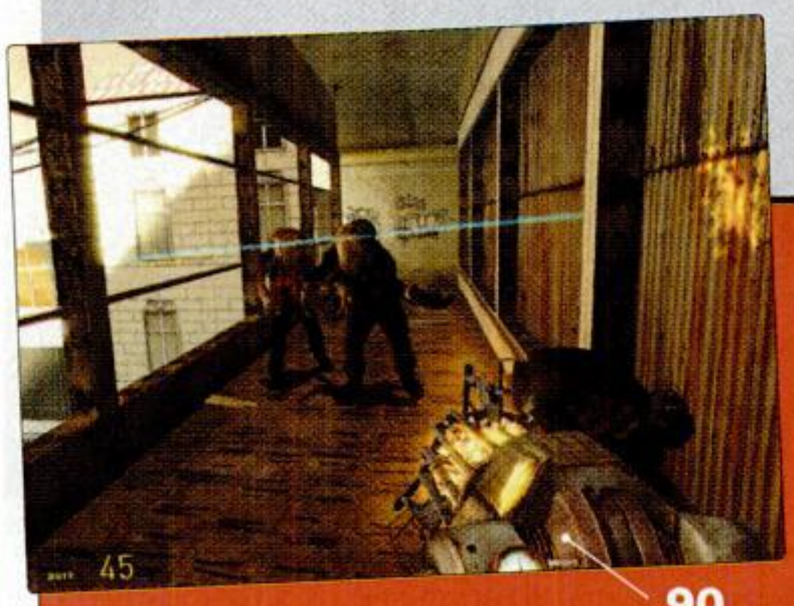

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Get Ready for Direct X 10

Microsoft is throwing the baby out with the bath water—and that's a good thing when it comes to DirectX, because the new version looks to be lean, mean, and clean

Backward-compatibility is the bane of many a programmer's existence. Creating software that's capable of running on hardware that's five or more years old can lead to a creaky, cranky, unstable product; backward-compatibility is also one of the biggest causes of code bloat. So for the first time in the history of DirectX, Microsoft is rebuilding its infamous collection of APIs and streamlining them into one all-inclusive package. According to Microsoft, the result is a DirectX that's faster, contains less resource-hogging overhead, and will enable developers to create visual and other effects that have never before been possible on the PC. But this power carries a price: DirectX 10 will be integrated into Windows Vista only (the new OS will also include DirectX 9), and none of the current-generation GPUs are DirectX 10-compatible, so you'll have to upgrade your hardware to get DX10 support.

Most of DirectX 10's advancements are on the graphics side, and include the brand-new Shader Model 4.0. In addition to its heavily revamped pixel and vertex shaders, Shader Model 4.0 will sport an all-new geometry shader that sits between the other two shaders in the Direct3D pipeline.

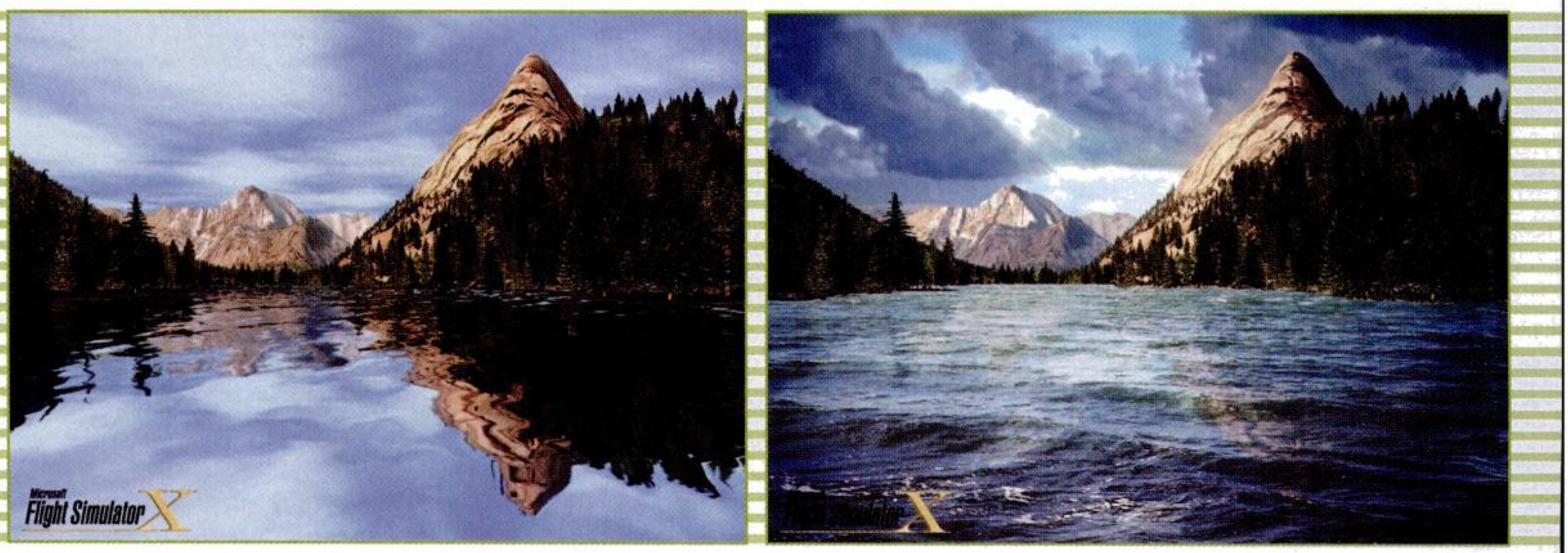
The geometry shader accepts the output from the vertex shader, in the form of a single vertex (a point, line segment, or triangle), and affixes additional attributes to it—a realistic shadow, for instance. The geometry shader can also be programmed to create additional geometry by multiplying a single vertex and then outputting multiple copies, each with different attributes. These new features should enable developers to endow their games with flowing cloth and more realistic fog, without hampering speed.

One feature that won't be included in DirectX 10—at least not at its initial release—is a physics API. "We are working with the companies that currently make physics engines," said Chris Donahue, Microsoft's director of business development for Games for Windows, "but we have nothing to announce at this time."

THE UNITY PLEDGE

In DirectX 9's graphics pipeline, vertex- and pixel-shader processing is handled by discrete units inside the GPU. The drawback to this design is that if the GPU becomes bogged down performing pixel-shader operations, the vertex-shader units could be left twiddling their thumbs until the pipeline is cleared. DirectX 10 seeks to eliminate this problem by supporting a unified architecture in which a single engine is capable of performing any shader operation: pixel, vertex, or geometry; whatever is needed at the moment. A component onboard the GPU, known as the "thread arbiter," will ultimately decide each shader unit's task.

This aspect of DirectX 10 is similar—philosophically, at least—to the Xbox 360's graphics architecture, which should make it easier for game developers to write games for one platform and then easily port them over to the other.



From the land of sky-blue waters: The screenshot on the left was taken from Microsoft's upcoming *Flight Simulator X* running under DirectX 9; the image on the right is a Microsoft artist's rendering of how the tenth anniversary game will look—theoretically, at least—running on DirextX 10.

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CPU for Dream Machine 2050?

A team of scientists from IBM and Georgia Institute of Technology recently astounded the PC overclocking crowd by announcing they'd pushed a silicon-germanium chip, which normally runs at 350GHz, to a ludicrous 500GHz. The insanely clocked CPU was cooled to about -451 F using liquid helium—just slightly warmer than absolute zero.

Though the ultra-high clock speed is certainly an astounding achievement, what's even more impressive is that it was achieved using low-cost manufacturing techniques and commercial chip technology. And though the power user in us salivates at running a 500GHz liquid-helium-cooled CPU, the ultimate goal of this project is to provide faster CPUs for mobile phones. Still, a guy can dream, can't he?

AMD Axes Large Cache CPUs

Just two months after launching its AM2 line of CPUs, AMD suddenly axed three out of the eight new dual-core procs—all of the consumer-level processors that feature 1MB of L2 cache, except the FX-62.

The company says it killed the 1MB parts to reduce a confusing overlap between processor models, and simplify its roadmap. The company's 2.4GHz Athlon 64 X2 was offered with both 512KB and 1MB of L2. The company said customer pressure is the main reason for the demise of the 1MB-cache CPUs. This should save AMD some money, as CPUs with greater L2 cache take up more space on a wafer than CPUs with smaller cache. By killing the procs with 1MB cache, AMD will be able to crank out more CPUs per wafer, increasing production capacity. AMD denies that cost savings was the primary motivator for the change.

BTX Is Back

Intel insists its ATX formfactor replacement is alive and well

We've been singing the BTX formfactor's swan song for months, but according to Intel, not only is BTX not dead, it's thriving. Intel recently released its BTX forecast, pegging the adoption rate at 36 percent by the end of 2007. It also claims that 5 percent of all DIY builds will be BTX within the same time frame. The numbers may seem fishy, but it makes sense when you consider that 92 percent of Dell desktops and 98 percent of Gateway desktops are BTX.

The BTX formfactor's massive CPU cooler won't be necessary with the cooler Conroe-based CPUs shipping soon.

TOM
HALFHILL

Super-Size Me

With both AMD and Intel working on quad-core processors for next year, people are wondering if we're in another shortsighted CPU arms race, like the earlier battle for astronomical clock speeds that ended in a cease-fire due to temperatures spiraling out of control. Will multicore processors hit a ceiling as well? Sure they will. Every technology has limitations. But someday, I think we'll see PC processors with dozens or even hundreds of cores per chip. And writing software for them won't be a major headache, as programmers fear today.

Chip-fabrication technology is the biggest technical limitation. Broadly speaking, the fabrication process determines the transistor budget (the number of transistors available to implement a design) and the chip's power consumption and manufacturing cost. Those are strict limits. Engineers can't integrate more cores than the transistor budget allows. Nor can a chip require so much power or cost so much money that it would be impractical. Within those limits, the potential number of cores that can fit on a die depends on the cores' size.

While AMD and Intel work on future quad-core processors, other companies already make processors with hundreds or even thousands of cores. Cisco Systems designed a chip for Internet routers that has 192 cores. Connex Technology has a video processor with 1,024 cores and a prototype with 4,096 cores. These cores, however, are much smaller and simpler than the x86 cores on PC processors.

Future PC processors, I believe, will integrate several complex cores with many simpler cores, and some cores will be highly specialized. Programmers won't have to write difficult multithreaded programs that distribute workloads across multiple cores. Instead, the operating system will assign particular tasks to individual cores. The network stack might run on a simple core optimized for packet processing. Bigger tasks will run on the complex general-purpose cores. If some cores are idle for a while, so what? We won't worry about wasting CPU cycles, just as today we don't worry about not using every available byte of RAM or megabyte of disk space.

I expect AMD and Intel will begin designing these superchips when engineers reach the integration limit using conventional x86 cores. That limit is less than 10 years away.

Tom Halfhill was formerly a senior editor for Byte magazine and is now an analyst for Microprocessor Report.

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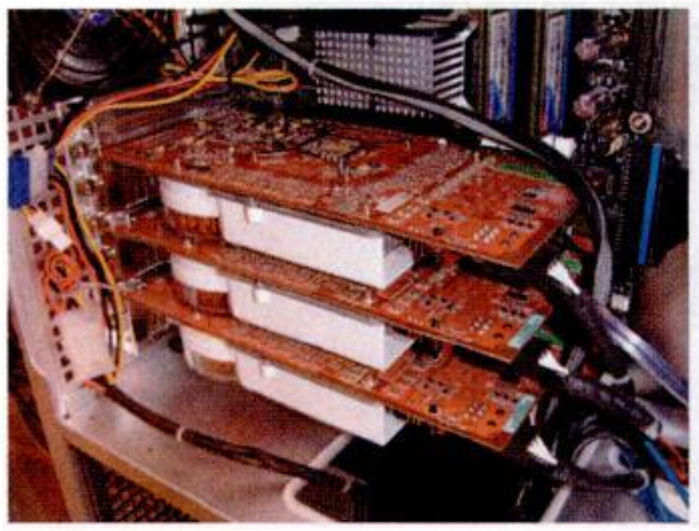
ATI Invites Gamers to a Three-Way

'Boundless Gaming' initiative now includes new tools for developers

ATI surprised no one with last June's announcement that its GPUs would support physics acceleration using Havok's physics middleware. But it's a whole new kettle of pixels now that ATI intends to let people run as many as three videocards—two in CrossFire mode to render graphics, and a third card dedicated to physics.

How do you fit three videocards in a PC? Simple: Buy one of those newfangled motherboards outfitted with three x16 PCI Express slots (although that third slot—at least for now—is x16 in formfactor only; it runs slower than that).

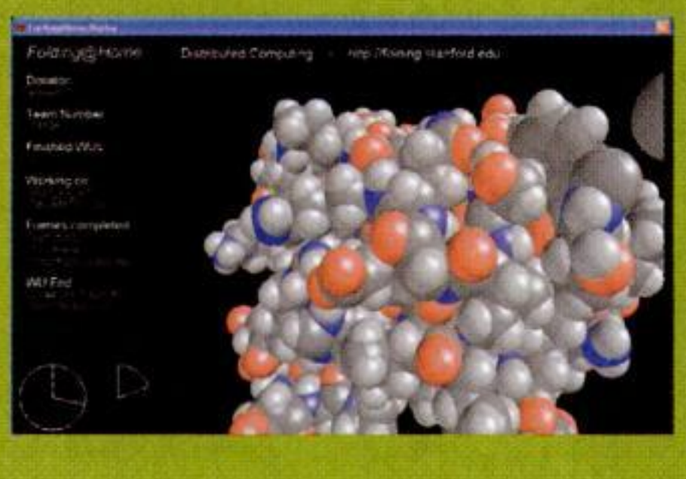
To demonstrate ATI's dedication to physics, the company is even offering a new physics plugin for *Maya*, Autodesk's high-end modeling, rendering, and animation tool. Using ATI's workstation videocards and this new physics plugin, developers can create interactive physics effects within *Maya*.



It sounds crazy, but ATI thinks people will buy three GPUs so they can dedicate two to graphics and one to physics.

"Today, physics are applied after the scene is rendered," explained Raja Koduri, ATI's director of engineering. "Using our technology and Maya Dynamics, the artist will be able to apply physics properties to every object in the scene before it's exported to the game engine."

Cure Cancer in Your PC's Spare Time



Attention readers: We need you to join *Maximum PC's* folding@home team! The folding@home project is run by Stanford University, in an attempt to cure diseases using the power of distributed computing. Download the client from **http://folding.stanford.edu**, fire it up, and enter team 11108. We also have a folding discussion online at **www.maximumpc.com/forums**.

Microsoft Wades into Physics Battle

We ran a rumor mill story in July about Microsoft's plan to introduce its very own physics API—dubbed Direct Physics. Now, two months later, there's a job opening on Microsoft's website for a "Direct Physics" programmer. The ad states that the company is looking for an engineer, "to join a growing team responsible for developing Direct Physics."

It makes perfect sense for Microsoft to wade into the physics scrum because, ultimately, having a single, unified physics API will benefit consumers and developers (as long as it's as good as, or better than, what Havok and Ageia have to offer). Rich Wickham from Microsoft's Games for Windows group told *Maximum PC* he wrote the ad almost a year ago, but insisted that the company has no plans for a physics API. Wickham stated that clearly physics are up-and-coming, and it simply wants to be on top of the situation.

GAME THEORY

THOMAS **MCDONALD**

The Other 'Episode One'

Say "Episode One" to most people and they're likely to shudder, recalling a floppy-eared abomination saying, "Mee-so Jaa-Jaa Beenks!" Gamers, however, now have a new, far-more pleasant "Episode One" association, thanks to Valve Software's *Half-Life 2: Episode One.*

With Steam, its online content delivery system, Valve proved the potential of direct delivery of software to the end-user via broadband, bypassing the retail channel. With *Episode One*, Valve has demonstrated a new, unanticipated feature of the Steam service—the ability to draw players in like never before and keep them coming back for more.

In a way, the birth of episodic gaming is reminiscent of the way massively multiplayer games changed our expectations of the way game worlds expand and grow over time with new missions, regions, or characters. That model doesn't really work with single-player games, where users can, at best, hope for a few new multiplayer maps or an expansion pack. Steam's quasi-MMO features (a front end, retail hooks, news, auto-downloading of patches, and community features) allow Valve to create a more involved solo experience.

Episodic gaming will allow new installments for *Half-Life 2* and *Sin* to be released at regular intervals. Users can thus add new chapters, each running about four to six hours, to their games. With *HL2*, a single three-part story arc is planned to be released over the next 18 months, continuing the original game, as Gordon and Alyx return to finish off the Citadel. *Episode One* even comes with a remarkably innovative and informative commentary track, providing tips and fascinating behind-the-scenes details about the game's design.

Even though it's new to PC gamers, episodic gaming is really just a classic serial format, used by everyone from Charles Dickens to television shows like *Lost*. Serial storytelling has a powerful appeal, stretching the narrative experience over months and giving it time and room to become a part of people's lives. An expansion, on the other hand, is released, bought, played, and forgotten. With the episodic format, Valve can create an ongoing experience to keep players returning—something that simply wasn't possible with a single-player game before.

Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.

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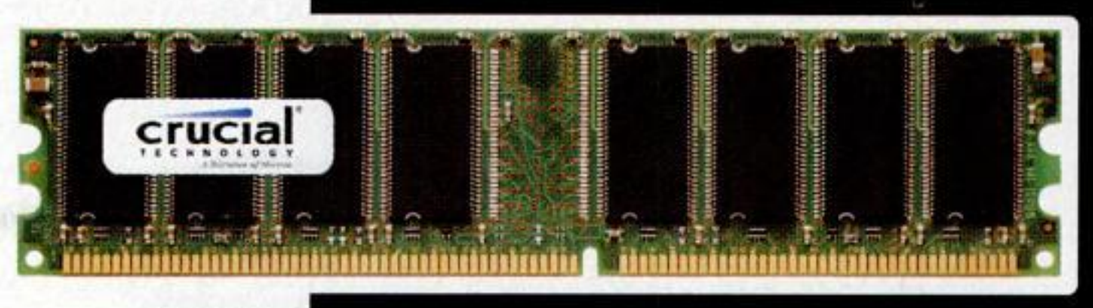
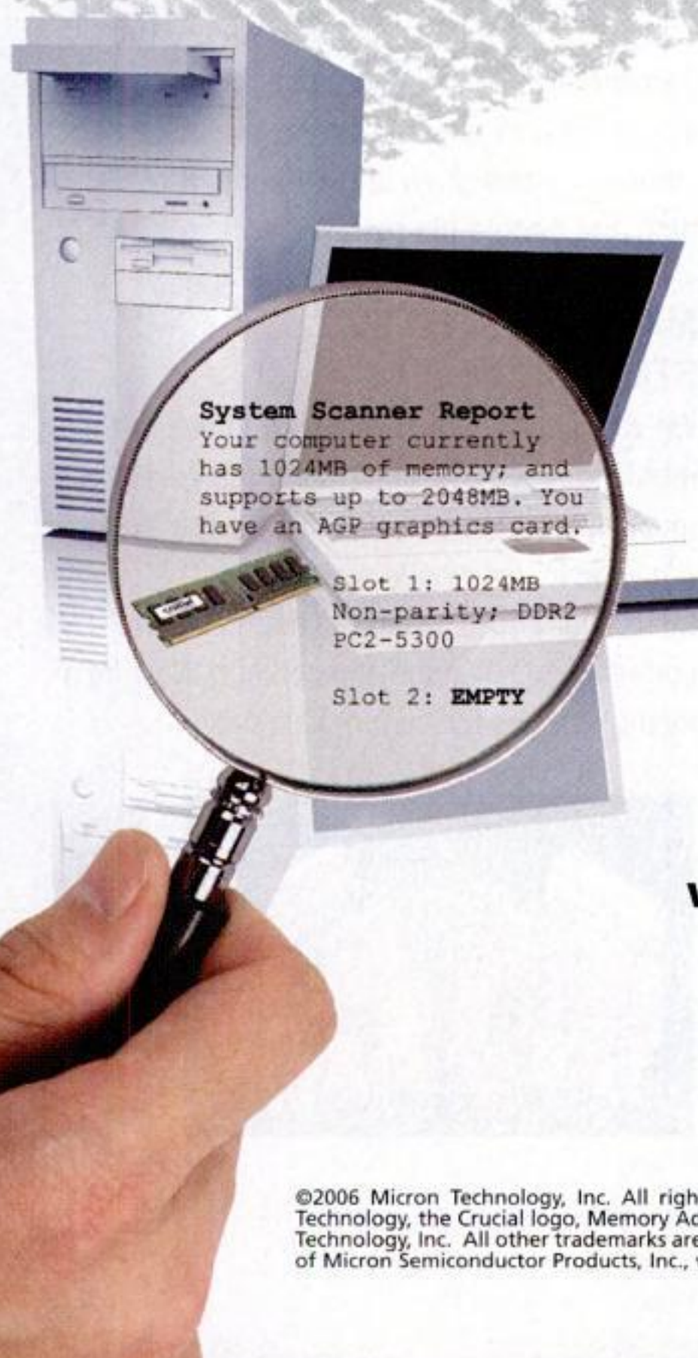


MEMORY MYSTERY SOLVED, CASE CLOSED.


System Scanner Report
Your computer currently has 1024MB of memory; and supports up to 2048MB. You have an AGP graphics card.
Slot 1: 1024MB Non-parity; DDR2 PC2-5300
Slot 2: EMPTY

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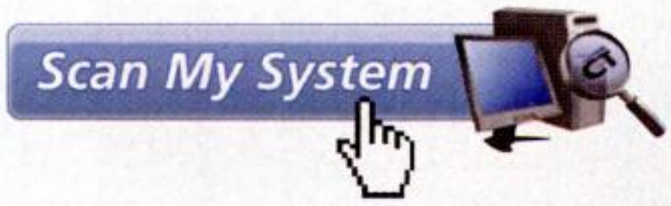

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How do you make the handiest tool in the world handier? Make it cordless, and scale it down so it's easy to carry around, that's how. Dremel's pistol-grip Stylus is the perfect size for small jobs, and has ample power despite being battery-operated. The lithium-ion battery is rechargeable via an included charging cradle. The stylus even comes with a handful of bits for polishing, cutting, and grinding; plus, it works with standard Dremel bits. $70, www.dremel.com

Microsoft Pulls WinFS from Vista

The file system goes from 'it'll ship later' to 'it won't ship for consumers, ever'

Cancel Christmas, folks—WinFS is dead, and it ain't coming back to life. The oft-delayed futuristic file system once touted by Microsoft as a must-have feature of Vista has gone from a product that'll ship after Vista's launch to a product that won't ship, period. Instead, the WinFS technology will be rolled into Microsoft's enterprise database products.

The news came directly from the horse's mouth. Posting on the WinFS team blog, Quentin Clark, a WinFS programmer, wrote about several changes the team was making to the system, and noted: "These changes do mean that we are not pursuing a separate delivery of WinFS."

For consumers, the demise of WinFS is disappointing, to say the least. It would have allowed users to attach metadata to emails, images, *Word* documents, and other files that would be indexed by the OS. You could then perform searches based on this data, which would have been a revolution in the world of file storage. Oh well, at least Aero Glass looks shiny.

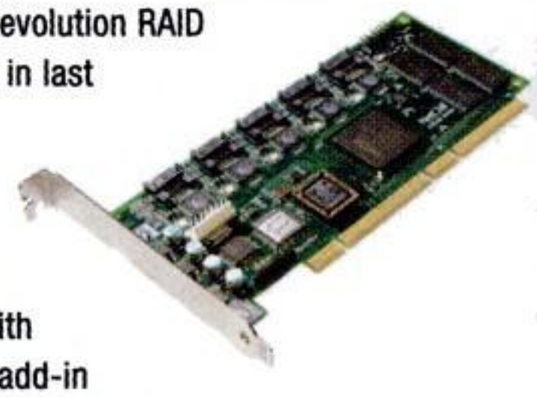
Reverse-Hyper-Threading to Arrive Sooner than Expected?

In July, we speculated that one way AMD might be able to compete with Intel's Conroe CPU is to implement reverse-Hyper-Threading. By having two cores appear to applications as one super-core, multicore CPUs could deliver more performance to single-threaded applications. The latest rumors hint that not only is the tech real, but it's already implemented in AMD's new socket AM2-based CPUs. Even more surprising, it seems Intel might have similar technology embedded in Conroe. An image popped up on the Internet of an Intel 975x mobo with a "Core Multiplexing Technology" option available in the BIOS. We contacted both companies about this issue, but neither Intel nor AMD would comment on the rumor.

FUNSIZENEWS

NETCELL GOES UNDER

This month we're sad to report that Netcell has gone out of business. You don't remember Netcell? Neither did anyone else, which was one of the big problems. Netcell was the maker of the Revolution RAID controller we used in last year's Dream Machine. Though the company secured a distribution deal with XFX, its driverless add-in RAID controllers never really took off with consumers.



MICROSOFT CUTS OFF WIN98 SUPPORT

News flash: Some people are still using Windows 98, 98SE, and Windows Millennium. We found this out when Microsoft announced its plans to discontinue support for these old, crappy OSes in July 2006. Look, you don't have to be excited about Vista, but for the love of Pete, at least upgrade to XP, you damn Luddites.

MICROSOFT PREFERS GOOGLE

Or at least its employees do. According to Internet-tracking firm VisitorVille Intelligence, 66.3 percent of Microsoft employees use Google for searches. Not surprisingly, 100 percent of Google workers use Google. Yahoo workers are also very loyal, using that company's search engine 68 percent of the time and Google the rest of the time.

MAN ARRESTED FOR STEALING WI-FI

We've all considered driving up to the parking lot of a coffee shop that offers free Wi-Fi and mooching off the connection for a few hours. A guy up in Vancouver actually did it—for more than three months—until finally the coffee shop called the cops on him. Now he's facing charges for theft of services.

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Neo HE

Powered by leetness!

You can have the leetest hardware imaginable in your gaming rig, but it wont matter if you run it with a cheap, unstable power supply. That's why the Neo HE power supply from Antec is the power supply of choice for gamers everywhere. These power supplies come with three individual 12V rails, they come SLI ready, and can handle just about any hardware you can throw at it. Neo HE power supplies also feature modular cabling so you only need to connect the power cables you actually use, and don't have to worry about having a rats nest of unused cables everywhere. The Neo HE, combined with your high-end hardware makes for a stable and highly efficient noob owning machine. Find out more about Antec Neo HE power supply at **www.antec.com**.

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Amplified Antenna **vs.** Powerline Range Extender

Wireless-router manufacturers are enticing you with Draft-N and third-generation MIMO routers that pledge range significantly superior to that of 802.11g wireless gear.

But there's a voice whispering in your ear: "Don't fall for their hollow promises. 802.11g is a bona fide standard; 802.11n is vapor."

What's a LAN builder in need of increased range to do? Forsake interoperability now and forever? Gamble that "Draft-N" gear really will be compatible with the final IEEE standard? Settle for 802.11g gear and live with the dead spots?

Allow us to suggest another path: Extend the range of your existing wireless network today and maintain interoperability now and in the future by adding to your gear, instead of replacing it with hardware that has an uncertain future. We brought two alternatives into our real-world test lab—a 1,900-square-foot suburban home—to see which would deliver the best user experience.

We pitted an amplified antenna from RadioLabs against a powerline range extender from NetGear to see which product enabled us to wander the furthest from a Linksys WRT54G 802.11g Wi-Fi router.

BY MICHAEL **BROWN**

AMPLIFIED ANTENNA
RadioLabs 2.4GHz Wireless Range Extender Amplifier, $120, www.radiolabs.com

round 1 EASE OF INSTALLATION

Setting up Netgear's Powerline Range Extender Kit is akin to building an entire second network. You plug a powerline Ethernet bridge into an outlet near your router, hard-wire the bridge to your wireless router, and plug the wireless access point into an outlet near where you need the added range. You then configure the wireless adapter card in your remote PC to talk to the new access point.

Installing RadioLabs' amplified antenna is a simple matter of removing an antenna from your wireless router, replacing it with the RadioLabs model, and plugging its power supply into your outlet strip. There's no need to configure your remote PC, since it will be talking to the same router it talked to before.

WINNER: AMPLIFIED ANTENNA

round 2 FUTURE COMPATIBILITY

Although Netgear's Powerline Range Extender Kit uses Ethernet-over-powerline technology to communicate between its wireless access point and hard-wired bridge, the AP is fully 802.11b- and 802.11g-compliant. Since any eventual 802.11n standard must be backward-compatible with these protocols, it stands to reason that Netgear's product will operate with this next-gen technology, too.

It's a foregone conclusion that the eventual 802.11n standard will rely on MIMO symmetrical antenna technology, which means it's unlikely you'll be able to connect RadioLabs' amplified antenna to an 802.11n router next year.

WINNER: POWERLINE RANGE EXTENDER

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round 3

PRICE/PERFORMANCE RATIO

If we were looking only at price tags, this category would be a tie: Netgear's WGXB102 54Mb/s Powerline Range Extender Kit and RadioLabs' 2.4GHz Wireless Range Extender Amplifier both sell for around $120. But since we're measuring price/performance ratios, RadioLabs crushes the competition by offering incredible range.

WINNER: AMPLIFIED ANTENNA

round 4

RANGE

We set up our Wi-Fi-enabled laptop in four locations in and around our test home and recorded signal strength as reported by our Wi-Fi adapter. The powerline range extender gave us a pitiful 1 percent boost in signal strength at 25 feet; when we moved to an outdoor location 75 feet from the router (50 feet from the range extender), we experienced weaker signal strength with Netgear's device than without it.

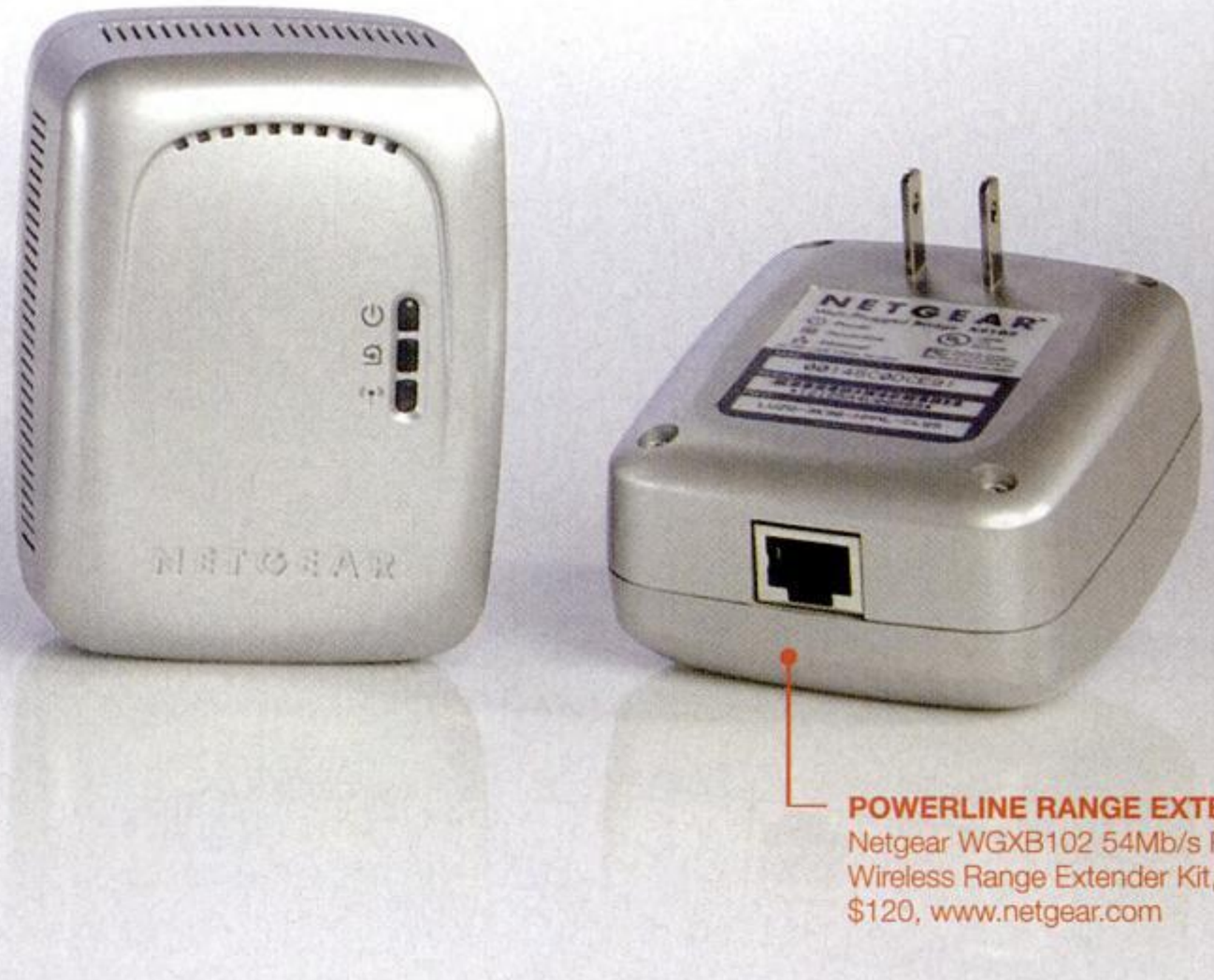
You know you're talking power when your router's antenna requires a heatsink. The RadioLabs model we tested features a 500-milliwatt bi-directional amplifier that boasts an RF transmit level of 27dBm, compared to our stock router's 18dBm. That enabled us to roam a half-block from our test location—240 feet as the crow flies, with two entire homes occluding the signal—without losing our Internet connection. Yowza!

WINNER: AMPLIFIED ANTENNA

BENCHMARKS

WI-FI SIGNAL STRENGTH AT LAPTOP	STOCK LINKSYS WRT54G	LINKSYS WRT54G WITH NETGEAR WGXB102	LINKSYS WRT54G WITH RADIOLABS AMPLIFIED ANTENNA
DISTANCE FROM ROUTER			
25 FEET	75%	76%	**86%**
75 FEET	26%	10%	**42%**
100 FEET	0%	0%	**28%**
240 FEET	0%	0%	**18%**

Best scores are bolded.



POWERLINE RANGE EXTENDER
Netgear WGXB102 54Mb/s Powerline Wireless Range Extender Kit, $120, www.netgear.com

And the Winner Is...

One of the biggest problems with wireless routers is that they don't deliver enough range, especially if your home has multiple levels, thick walls, or is particularly large. The proposed 802.11n standard promises to address this, but it's still very uncertain when the IEEE will finally approve the nascent standard.

Wireless-router manufacturers, meanwhile, hope you won't wait: They'd love to sell you a whole collection of new gear today—and then a whole new batch next year.

If your existing network is based on 802.11b and 802.11g equipment, RadioLabs' amplified antenna will boost its range by a very wide margin. The best part of the deal is that you don't need to upgrade your Wi-Fi adapters, media-streaming boxes, or any other wireless products in order to benefit from it.

If your PC is out of your wireless router's range, but is in close proximity to an electrical outlet, Netgear's range extender just might solve your problem. But each one creates a very small access bubble. MPC

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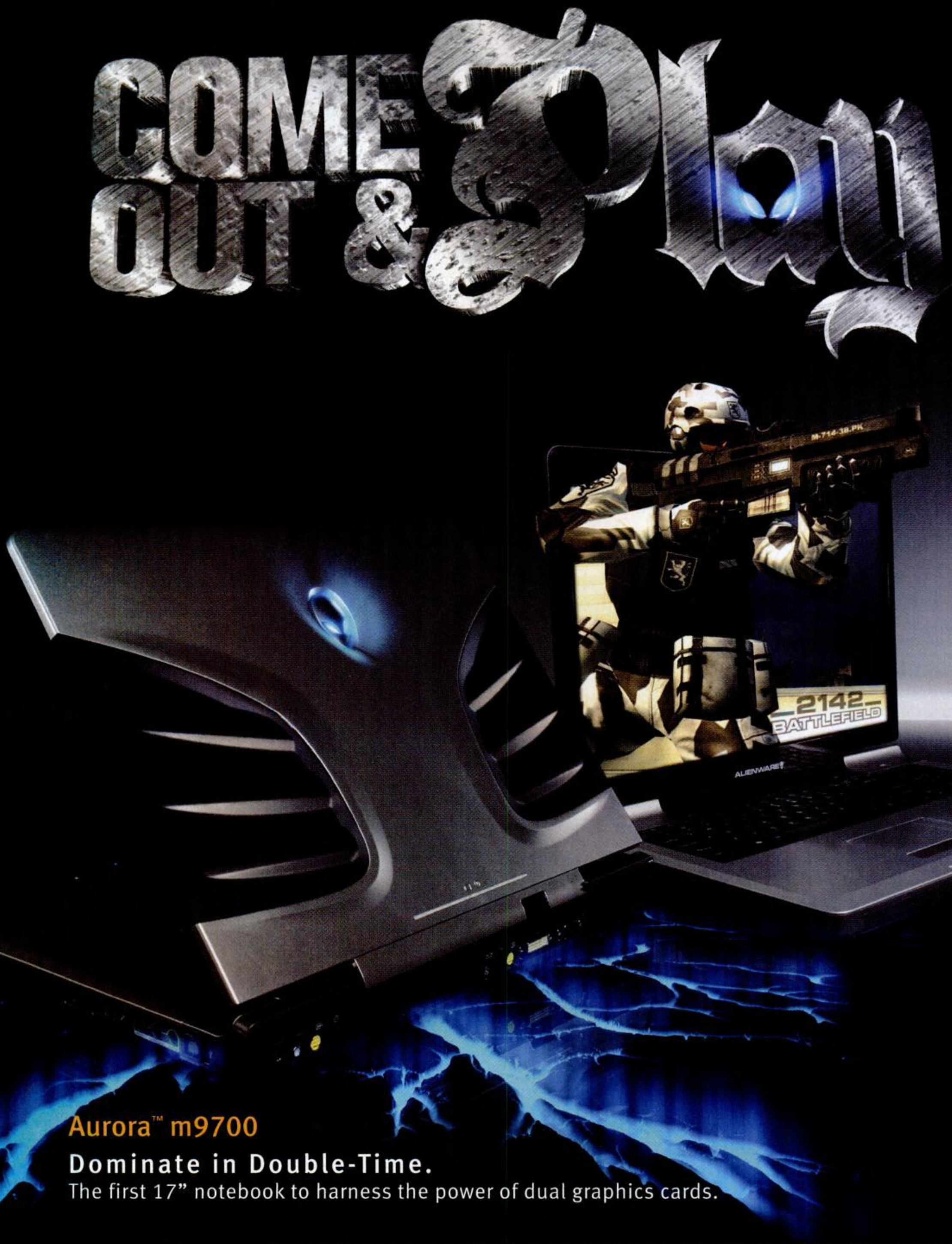

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Our consumer advocate investigates...

✓Super Dell ✓Spyware Soft Stop ✓Lifetime Warranties ✓USB Geek

Moozer, Watchdog of the month

SUPER DELL FOUND NOT GUILTY OF GUN CHARGES

In June, the Dog reported on the weapons charges filed against Totally Awesome PC owner "Super" Dell Schanze for allegedly pulling a pistol on neighbors. So in all fairness, we must also report on the disposition of the charges. A jury found Schanze not guilty of the weapons charges, but guilty of making a false written statement to the police, according to a story in the *Deseret News*.

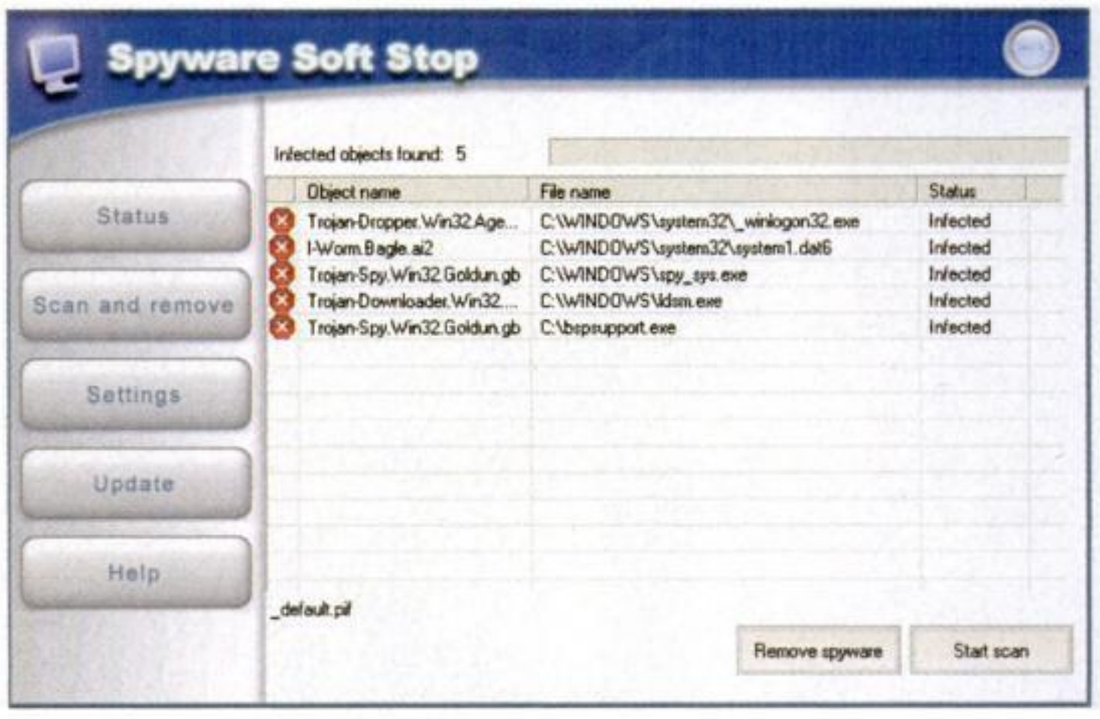
Schanze was accused of pulling a 10mm Glock on residents of Draper, Utah, after they chased him. The residents alleged that Schanze raced down the street their children had been playing on, at unsafe speeds. Schanze countered that he only pulled his weapon after he feared for his life and the life of his 8-year-old daughter who was a passenger in his Jaguar. Schanze pleaded guilty to charges of reckless driving associated with the case and went to trial on the other charges. The false-statement conviction stems from Schanze's assertion to police that he had not pulled his pistol.

SPYWARE SCANNER OR IMPLANTER?

I wanted to warn other readers about a potential problem. My friend downloaded a "spyware scanner" from SpywareSoftStop.com that I think also installed some of its own pests. Warning messages now pop up in the taskbar, linking to fake Windows updates as well as the Spyware Soft Spot website itself. I think this is highly unprofessional. A quick "whois" of the domain says it belongs to some Russian porn site.

—Tim Lau

You're right to be suspicious, Tim. Not that all websites registered out of the former Soviet Union, or even porn sites, are necessarily questionable, but SpywareSoftStop.com certainly shows all the signs of being illegit. Numerous anti-spyware shops have identified the program as a "rogue," so the Dog decided to test out the app on a clean-as-a-whistle virtual version of Windows XP Pro. After installing and updating *Spyware Soft Stop*, the program immediately identified numerous threats including one file in the root of the hard drive. Curious. The Dog killed the session, erasing the changes and created another session with a clean copy of XP. The Dog checked the root for any suspicious files and there were none. Downloading and installing *Spyware Soft Stop* again while watching the root directory, the Dog observed a file being created during the installation. And what a coincidence, *Spyware Soft Stop* identified that file as spyware! The other files the program tagged also did not exist prior to *Spyware Soft Stop* being installed. But just how dangerous are these files? The Dog scanned the allegedly infected files using *AVG*, *Symantec AntiVirus*, and the spyware/Trojan hunter *A-Squared*. None keyed in on the files.



Some files identified as spyware didn't exist on our machine until *after* we installed *Spyware Soft Stop*.

The basic lesson is to avoid *Spyware Soft Stop* and to consult SpywareWarrior.com's list of rogue spyware products before running something new. Woof.

DIAMONDS ARE A BOY'S BEST FRIEND

After reading the review of the MSI K8N Diamond Plus motherboard in your May edition, I was pumped to get this board. I have the cash now, but the board is almost nonexistent in online retail. I'm a bit scared; was the board pulled off the market for some reason? Talk to me, Dog.

—Dan Kliebhan

The Dog feels your upgrade pain. Numerous other readers and forum posters on the Internet have also complained of the difficulty in obtaining this motherboard. The Dog pinged an MSI official who told him: "The K8N Diamond Plus board is one of the most popular boards we have and we just don't have enough in stock." With the sun rapidly setting on AMD's Socket 939, the spokesman said, the factory has switched over full-force to AM2 boards. So, the good news for anyone who actually owns this mobo: It's a great board. The bad news for anyone who wants to buy one in S939 trim: You simply won't be able to find it.

USB SLOW BOAT TO HONG KONG

I purchased a Corsair USB 2.0 Flash Voyager 2GB flash drive from USBGeek.com and it stopped working within a few weeks. As advised by USB Geek, I returned the drive for a replacement. This was more than two months ago. USB Geek has not sent me a replacement, and it has stopped responding to my repeated emails about this item.

— Edward B. "Ted" Arroyo

The Dog spoke with USB Geek and was told that the company had just recently received the drive and examined it. The drive was found to be defective and USB Geek said it would exchange the item. The delay, the Dog surmises, was due to USB Geek's overseas location. Still, two months harkens back to the days of tramp steamers or tall wooden ships. Yar! Although the service in this case was poor, the company doesn't appear to have a bad reputation. No one has bothered to comment, negatively or positively, about the

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **watchdog@maximumpc.com.** The Dog promises to answer as many letters as possible, but only has four paws to work with.

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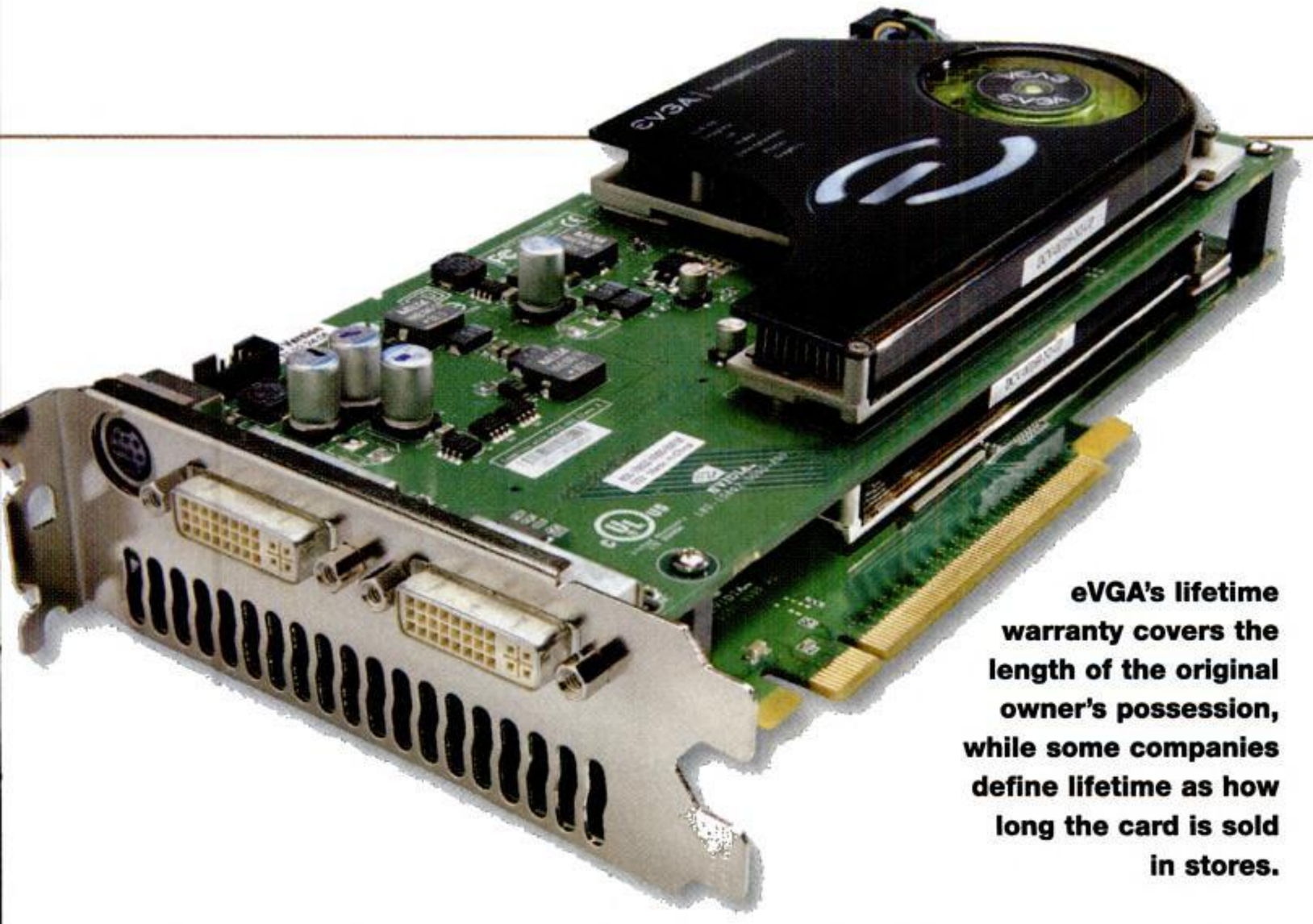


eVGA's lifetime warranty covers the length of the original owner's possession, while some companies define lifetime as how long the card is sold in stores.

company at ResellerRatings.com. For what it's worth, USB Geek seems to be the go-to place for such USB oddities as the USB rat speaker, USB duck fan, and a mouse with Homer Simpson floating in it.

LIFETIME MEANS LIFETIME?

In your July column on "lifetime" warranties, I think you missed the fine print. Your article presented various lifetime warranties of graphics cards and you mentioned that PNY's warranty of "lifetime of the product on the market" was one of the shortest in the industry.

But what about the warranties from VisionTek and eVGA that say "...for the lifetime of the product"? You failed to realize that the failure of the product is the "death" of the product, and offers no warranty at all. This is something that came up 15 years ago in consumer magazines that rated all kinds of consumer products and warranties. Their advice then: Check the warranty, and buyer beware.

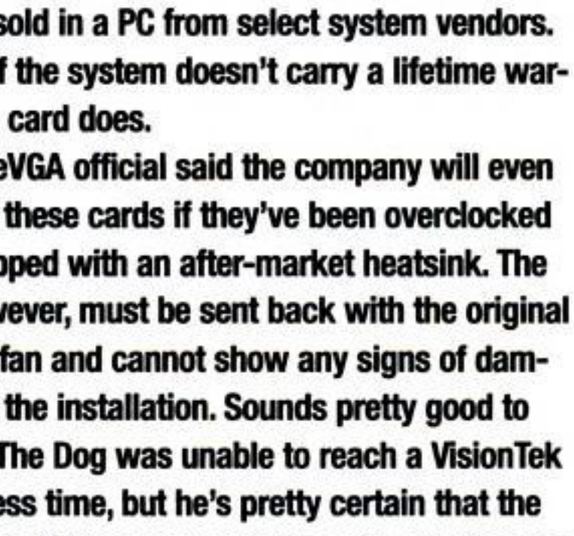
It's time for the manufacturers to truly stand behind their products with clearer warranties; and not just for videocards. Consumers vote with their money. My $500 will never be spent on a product that doesn't offer a clear warranty, or with sketchy companies such as the ones that turn up in the dog pound. Woof!

— Bob Evans

You make a good point, Bob. As the Dog said in his July column, consumers should always be skeptical of lifetime warranties, especially when technology companies are known to define the term loosely. However, the Dog believes you're wrong about eVGA. The Dog contacted eVGA to get the full scoop and was told that the warranty doesn't die when the card dies. According to an eVGA official, if you bought a 7800 GTX card in 2005 and it dies in 2006, or even 2010, eVGA will repair or replace the card. The company defines "lifetime" as the lifetime the card is with the original owner. The policy doesn't apply to all of eVGA products—just those with part numbers ending in AX, DX, or FX. The company even goes so far as to warranty these cards when they are sold in a PC from select system vendors. So even if the system doesn't carry a lifetime warranty, the card does.

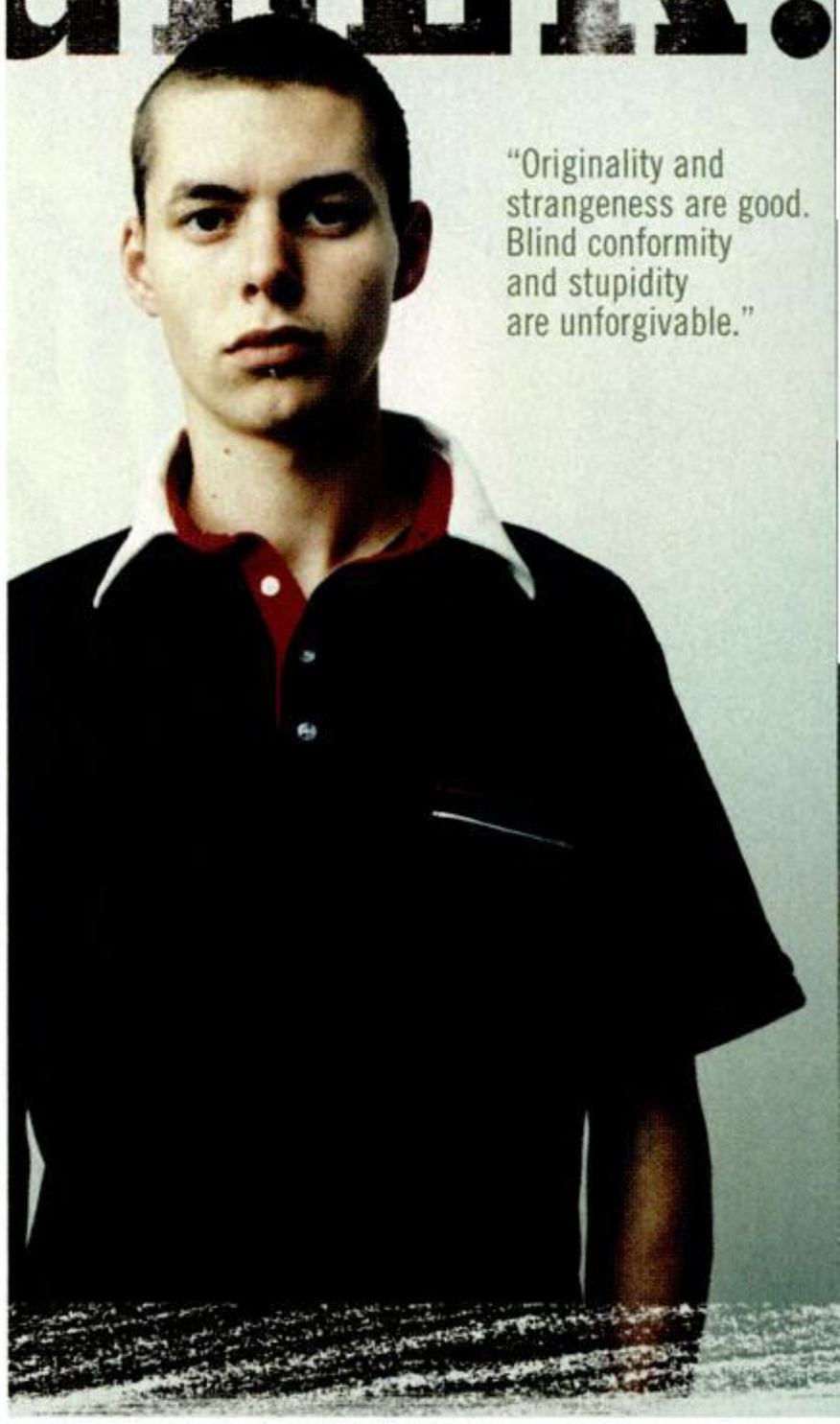
The eVGA official said the company will even warranty these cards if they've been overclocked and equipped with an after-market heatsink. The card, however, must be sent back with the original heatsink fan and cannot show any signs of damage from the installation. Sounds pretty good to the Dog. The Dog was unable to reach a VisionTek rep at press time, but he's pretty certain that the company's lifetime warranty doesn't end when the card dies, either. Woof! Woof! MPC

Recall **Alert**



Hewlett-Packard says some 679,000 Photosmart R707 digital cameras it sold could cause non-rechargeable batteries to overheat when the camera is in its docking station or on an AC adapter. HP has received one report of a camera catching fire and causing smoke damage. HP says a firmware update to camera the will correct the problem. For more information visit www.hp.com/hpinfo/newsroom/recalls.html, or call HP toll free at 866-304-7117 between 6 a.m. and 6 p.m., Mountain time, Monday through Friday.

I'M A GEEK.



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DREAM MACHINE 2006

BY MAXIMUM PC STAFF

No ordinary PC will ever be fast enough to slake our thirst for speed—look beyond the pretty-boy paint job and you'll see a rig that will blow you away!

Take a moment and look closely at this rig. You can't see it beneath the glossy paint job on the one-of-a-kind aluminum case, but this beauty is a performance beast. In a world of 3.7GHz dual-core processors and quad-GPU rigs, finding a new way to capture the essence of Pure PC Power grows more difficult every year. This time we've outdone ourselves; we haven't just built the fastest rig we've ever tested—we've built a refined beauty, suitable for a place of honor in your living room. A truly Dream-worthy PC.

We'd never sacrifice power to build a beautiful rig—without the juice, this PC would just be another pretty face. If you have any doubts, dig the hardware. Our eleventh annual Dream Machine sports a so-new-the-silicon's-still-warm Core 2 Extreme processor, a pair of overclocked GeForce 7900 GTX videocards, almost two terabytes of storage, and a Blu-ray recorder that can slap 25GB of data onto a single 5.25-inch disc. And did we mention that it's the fastest rig we've ever tested—by a huge margin?

A computer this fast should require a license.

UNDER THE HOOD

The Dream Machine's beauty is more than skin deep! Beneath it's fancy exterior are the exact components DM2006 needs to power past the competition

THE EMPIRE STRIKES BACK

Yeah, we've been raving like AMD fanboys since the Athlon 64 snatched the performance crown from Intel two years ago, but we'll be the first to admit that the Athlon has a stump where its lightsaber hand was. Intel's new 2.93GHz Core 2 Extreme X6800 is simply heads, shoulders, thighs, and buttocks above the Athlon 64 and the Pentium 4 when it comes to performance. Hell, we *can't find* a benchmark that the Athlon 64 FX-62 wins.

THE NFORCE IS STRONG IN THIS ONE

What were you expecting, CrossFire and an Intel chipset? With all due respect to ATI and Intel, we wanted a chipset that supported two x16 PCI Express connections to the GPUs, with the potential to upgrade to quad SLI. The nVidia nForce 590 Intel Edition chipset, paired with XFX's hyper-clocked XXX GeForce 7900 GTX graphics cards in SLI, delivers the best performance.

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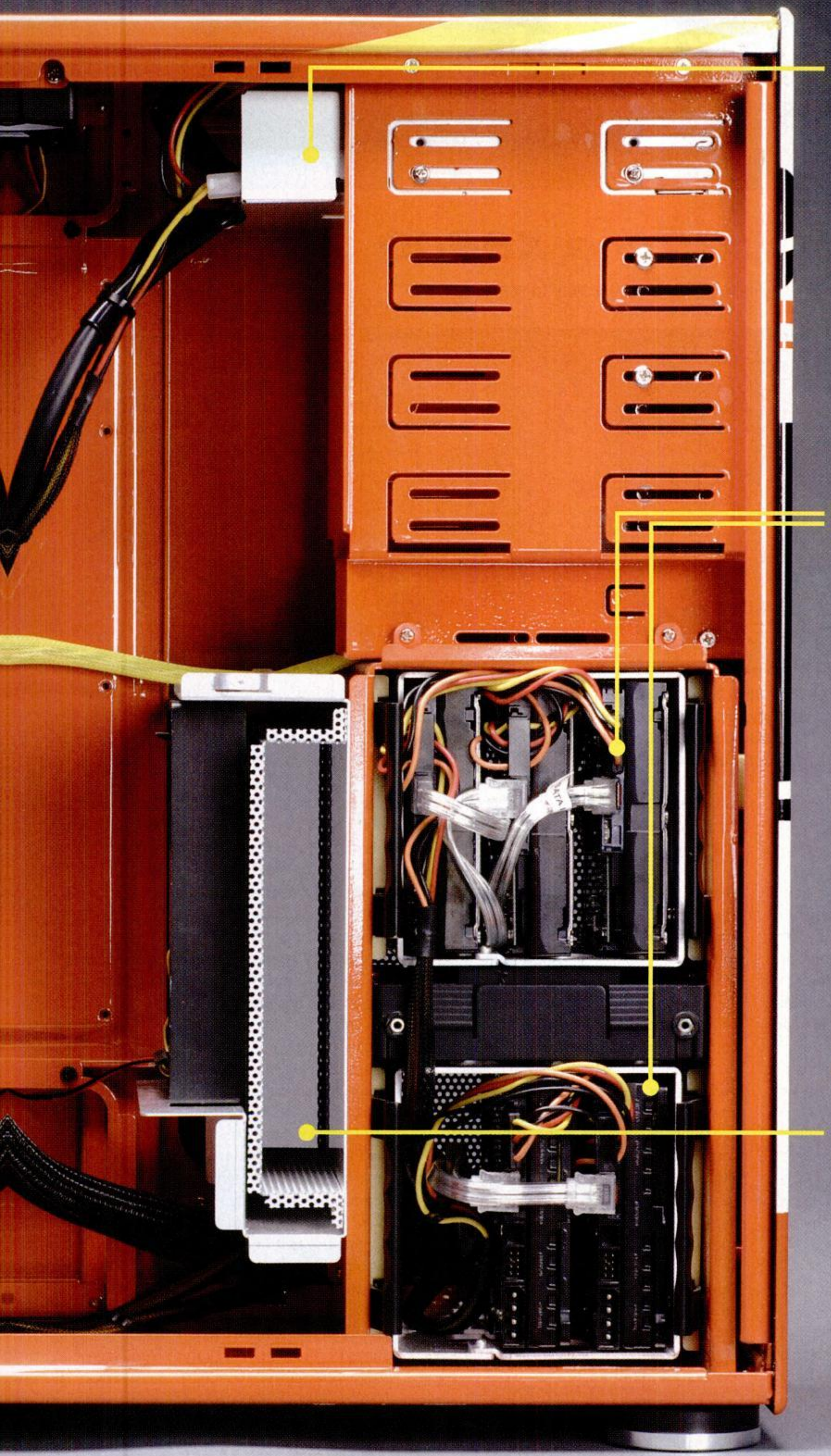

BLU-RAY BLUES

One day, we expect to be able to actually watch a Blu-ray movie on the Dream Machine, but the way the industry is moving, that may not be for the better part of a decade. In the meantime, we can still use our Pioneer BDR-101A to make nice fat backups of our important files, 25 gigs at a time. The drive, of course, also supports old-world DVD discs—including both double-layer varieties.

THINK OF IT AS A RAPCUDA

Paleontologists will make a shocking discovery in 35 million years when they unearth this year's Dream Machine: the fossilized remains of Raptors living with Barracudas! Dream Machine 2006 includes two 10,000rpm, 150GB Western Digital Raptor X drives in RAID 0 for speed, paired with three 750GB Seagate Barracudas running in RAID 5, to create a 1.5TB redundant array.

FIRE IN THE HOLE!

Today's multi-GPU setups put out enough heat to cook a bratwurst. Fortunately our Silverstone case features a mid-ship intake that lets the case suck in cool exterior air and blow it past the videocards via a 12cm fan. We would almost call it a BTX-like design, but that would inflame the ATX fanboys.

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Behold the Hardware!

We give you a part-by-part breakdown of every component in the Dream Machine

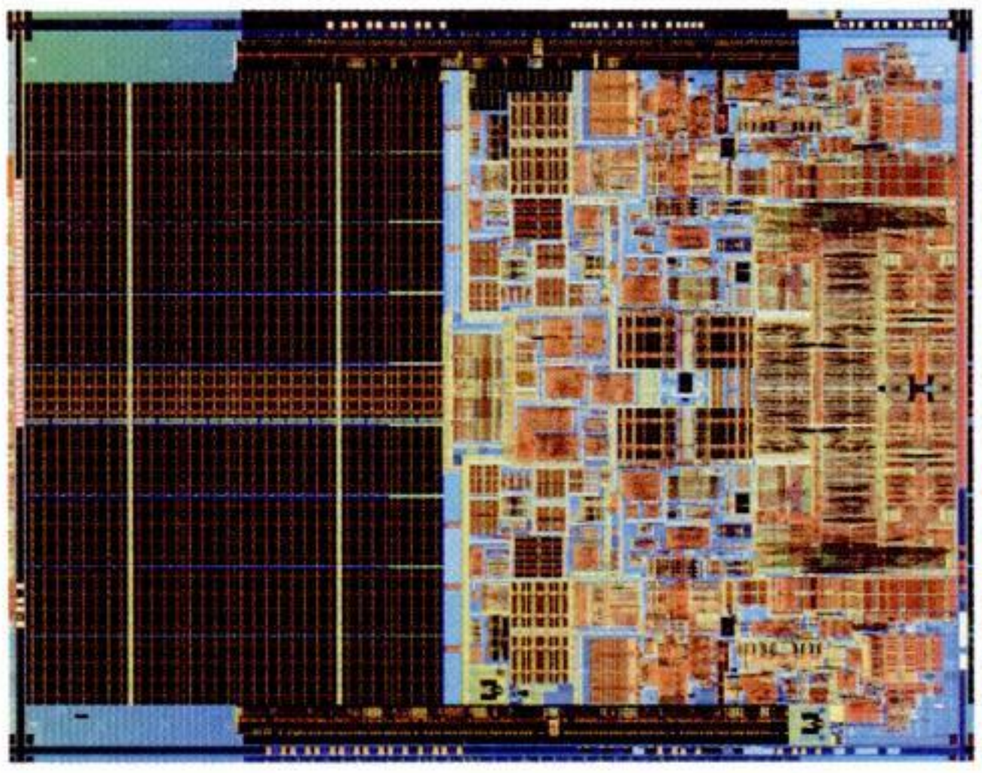
CPU

Intel Core 2 Extreme X6800

The new Conroe CPU delivers in a big way, with plenty of horsepower to spare

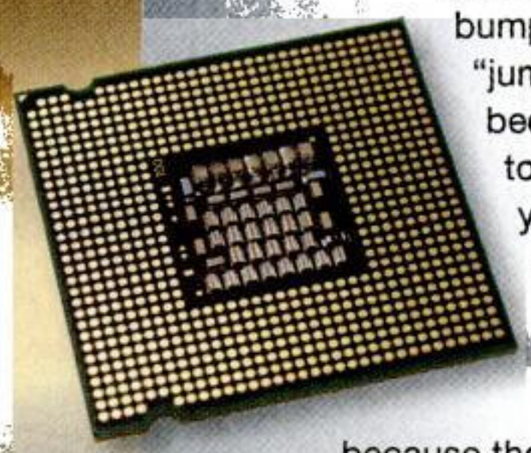
Years ago, when Intel was invincible and held the performance crown with an iron fist, we used to hear conspiracy theories that the company secretly had access to extraterrestrial technology. You've heard tales of the agreement between Intel-founder Robert Noyce and then-President Truman over the Roswell tech, right?

OK, as kooky as that sounds, Intel's new dual-core CPU—the Core 2 Extreme X6800—seems pretty otherworldly. It's that spooky-cool and scary-fast. Running at its stock 2.93GHz clock speed and under full load, the processor simply doesn't get hot. We thought we had it wrong, so we unplugged the power to the heatsink fan, loaded up the proc again, and it *still* ran for hours.



The Core 2 Extreme features both cores on a single die instead of two separate dies. Early next year, Intel will jam two dual-core Core 2, um, cores into a single die to make its quad-core processor.

The part that'll make you most believe the MiB angle, however, is this proc's performance. We're not talking about the little 5 percent clock bumps and performance "jumps" that we've all become accustomed to over the last few years—this is significant. In fact, prepare to create some new superlatives for this processor because the ones we have just don't do justice to the new architecture. Think "fastiest" or "stupenderifficier."



We aren't kidding. When we were still debating our CPU pick for the Dream Machine, we fired up the C2E with the same videocard, hard drive, and drivers that we used last month to benchmark AMD's AM2. The result? The C2E posted an unheard of 32 to 70 percent performance increase on CPU-bound tests. Let's say that again: 70 percent! In other words, this suckah is so fast, it should have its own theme song and an entourage that will push you to the curb if you get too close to its black C2E-style Escalade.

The CPU wars haven't seen this kind of all-out ass-kicking in the last decade. The original Athlon 64 FX-51 was fast when it launched, but it didn't put the hurt on Pentium 4 like this. The performance of the Core 2 Extreme X6800 is so outside the box, we wonder if Intel's found a new cache of fastier, post-Roswell UFO technology from which to fashion this CPU.

Publicly, Intel attributes the stellar performance to several factors in the new Core microarchitecture, which is an evolutionary offshoot of the Pentium M core. The Core 2 Extreme features a slightly longer 14-stage pipeline (versus 12-stages in the Yonah core used for the Core Duo and Pentium M). The Core microarchitecture is also "wider" with the ability to crunch four instructions at the same time, versus three in the Core Duo and Pentium 4. The C2E is also able to process a single 128-bit SSE instruction in one cycle, whereas the Athlon 64 and Pentium 4 take two.

Unlike Presler in the Pentium Extreme Edition 965, which used two independent CPU cores adjacent to each other, C2E is a "monolithic" chip with both cores residing on the same die. Because the two CPU cores in Presler were separate, the chips could not share information between their L2 caches without having to cross the slow front-side bus. With the monolithic C2E, both cores have full access to the L2 cache, which can be allocated on the fly depending on the task. If just one core is busy, it can use the entire 4MB cache while the other processor naps. The prefetching routines in this CPU are also greatly improved, so the chip's L2 caches are constantly churning the needed data and rarely have to reach out to slow main memory. According to Intel, the prefetch routine is so good that it effectively ameliorates main-memory latency and bandwidth issues. The company also claims that a survey of the front-side bus activity shows that it's very difficult to saturate the FSB with enough data to impact performance.

The CPU comes in the familiar LGA775 package, runs on the standard 1066MHz bus, and fits in most standard Intel boards. However, you can't assume it will work on older boards. Because the Core 2 Duo and Core 2 Extreme use less power than the Pentium 4, Pentium D, and Pentium Extreme Editions, the motherboard's voltage-regulation circuits have to support the lower voltage of the new chip.

For the last couple months, we've recommended that you hold off on purchasing a LGA775 mobo without Core 2 Duo/Extreme support and we're glad we did. This chip truly makes everything that came before—be it Athlon or Pentium—seem sluggish.

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MOTHERBOARD

nForce 590 SLI Intel Edition

There's only one way to run Core 2 Extreme with SLI, and we have it

The Dream Machine has always had a touch of exclusivity to it. We're pretty certain, for example, that you'll have a hard time finding an individually packaged Core 2 Extreme X6800 at your local screwdriver shop. Likewise, Blu-ray burners are pretty damned rare (not to mention painfully expensive.). And it doesn't get any more exclusive than our nVidia nForce 590 SLI Intel Edition motherboard. What? What? What? That chipset isn't even out yet!

We we're so enamored with the nifty tricks nVidia added to the new chipset that we had to have it. Of course, SLI support was essential, so we wheedled an engineering sample motherboard out of nVidia for this year's Dream Machine. This engineering board ain't pretty, and it's the very definition of a beta product, but it's also the only thing in town that'll let us run SLI with Conroe. (SLI is the only game in town for dual-GPU configs, as far as we're concerned.)

This motherboard lets us run both our videocards while at the same time giving us all the other goodness that nVidia has jammed into the nForce 590 SLI chipset. If you haven't been keeping up with current events, the nForce 590 SLI Intel Edition board can combine both Gigabit ports into a single two-Gigabit pipe. It can also prioritize your game packets so they don't get bogged down in the outgoing torrent traffic. And if you use SLI-Ready Memory, the info in the custom Enhanced Performance Profiles (EPP) makes overclocking a snap.

What's the main weakness of this motherboard? We couldn't get a damned I/O shield for it—you know, that metal plate that covers up the PS/2 and USB ports. But, that's a small price to pay for getting early access to this sweet chipset.

RAM

Corsair DDR2/800

Corsair and nVidia's push to include extra timing and clock-speed info with new DDR2 memory will be a great boon to the casual overclocker. As the co-creator of the Enhanced Performance Profiles that allow "SLI-Ready Memory" to work on the nForce 500 series platform, Corsair was our natural pick for RAM. At this early juncture, there aren't any fancy LEDs or nifty displays on the modules—just plain black heat spreaders. But that's OK by us—we'll take performance over bling any day.

We had a dilemma when it came to configuring our RAM. Intel claims that using four double-sided DIMMs gives Core 2 Extreme a healthy memory-bandwidth boost, but we don't think it's enough to make a difference. For the Dream Machine, we decided to go with future upgradeability; filling all the available slots with smaller DIMMs just seems like a bad idea. So we used two 1GB DDR2/800 Corsair DIMMs rated for operation at 1066MHz, instead of four 512MB DIMMs. If last year's Dream Machine packed 8GB, why did we drop to 2GB this year and forego running the maximum of 4GB? We're being more pragmatic this time around: There can be a lot of challenges to getting desktop motherboards to work with 4GB of RAM, and to be honest, it doesn't yield any performance increase for the cost.

MONITOR

Two Dell 2407WFPs

It might surprise you that we're not pairing our monster machine with the largest available desktop LCD. But we have our reasons for eschewing a 30-inch screen from either Dell or Apple. The 2560x1600 native resolution of the 30-inchers requires quad-SLI to draw that many pixels in modern games. And even with quad-SLI, the current 30-inch screens aren't optimal game displays: Many games don't even support the native res; and frankly, these panels just aren't that fast—they're prone to redraw errors and blurring that you won't find in a much-faster 24-inch LCD.

And when it comes to 24-inch LCDs, the only thing better than a Dell 2407WFP (reviewed on page 76) is two of these babies working in tandem. Indeed, the Dream Machine deserves nothing less than this pair o' 1920x1200 crisp, colorful screens that make even the most mundane applications look spectacular. Plus, we double up on all the spicy extras the 2407WFP offers—a component input, four USB 2.0 ports, two media readers, et al.

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VIDEOCARDS

Two XFX GeForce 7900 GTXs in SLI

For raw speed, the only GPU choice is a pair of GeForce 7900 GTXs—overclocked and ready to burn!

We toyed with the idea of fueling the Dream Machine's video engine with nVidia's dual-GPU, single-slot GeForce 7950 GX2. After all, it's the first videocard to support HDCP, which is a likely requirement for watching Hollywood movies on HD-DVD and Blu-ray. But in the end, we concluded that that part just wouldn't deliver enough octane; after all, we're not building a dream home-theater PC.

One look at the benchmark charts from our recently completed videocard roundup (August 2006) yielded the answer: Our choice had to be nVidia's GeForce 7900 GTX. But not all 7900 GTX cards are created equal, so not just any implementation would do. Based on our experience from the roundup, we knew that a pair of XFX's monstrously overclocked XXX Editions would send this year's Dream Machine rocketing down the highway.

In creating the 7900 GTX, nVidia basically respun our GPU of choice from last year's Dream Machine: the 7800 GTX. Both chips feature 24 pixel-shader units, eight vertex-shader units, and a 256-bit memory interface, but the new part redlines at much higher core and memory clock speeds: 650- vs. 430MHz for the core and 800- vs. 600MHz for the memory. It's also designed to handle twice the video memory: 512MB.

And then XFX stepped in to see just where it could take this category killer. Tuning nVidia's 7900 GTX like Dinan does BMW's M3, XFX supercharges the core and memory clock speeds to 700MHz and 900MHz, respectively. If that doesn't blow your hair back, babe, nothing will.

With the cards set to our Dell 2407WFP's native resolution of 1920x1200, the dual 7900 GTX XXX Editions smoked their collective tires to deliver our gaming benchmarks at smooth-as-Bentley-leather speeds.

And when you're ready for leisure pursuits beyond gaming, nVidia's latest PureVideo MPEG-2 decoder delivers exceptionally high-quality video performance—without the hassle of manually disabling SLI. Bring it on!

KEYBOARD AND MOUSE

Microsoft Natural Ergonomic Keyboard 4000 and Logitech G5

Comfort, reliability, and precision are what matter when it comes to the Dream Machine's controllers. Microsoft's new Ergo 4000 has finally usurped the classic Natural Keyboard Pro as our favorite typing plank. Its down-slanted design, padded wrist rest, and near-perfect layout make it truly worthy of Dream Machine-level decadence.

The Logitech G5 has a slightly different pedigree. Sure, its bulbous design is comfortable for marathon gaming sessions, but its secret sauce is entirely sensor-based. The G5's laser sensor offers pixel-smooth motion at three different resolutions. For fine movements—like sniping or photo editing—you can use the lowest setting. For twitch action, like aiming a tank turret in *Battlefield 2*, the high setting is perfect; and there's a third in-between setting for day-to-day use. The braided cord wrap, five-button design, checked rubber grips, and modular weight system make this the perfect precision mouse.

POWER SUPPLY

PC Power and Cooling Silencer 750

Even with the Core 2 Extreme X6800's electricity-sipping ways, we couldn't skimp on power with five hard drives, two videocards, and a Blu-ray drive to feed. We wanted power that's reliable, powerful, and quiet, so we turned to the go-to company for PSUs: PC Power and Cooling, and its new Silencer 750. This PSU gives us confidence that we won't smell the acrid scent of blown components on boot, or experience the power dropoffs and transients that have haunted lesser power supply companies. The best feature of the Silencer 750 is its silence, though. By lengthening the case of the PSU slightly, PC Power and Cooling says it was able to eliminate much of the cavitation noise of air being sucked over the components. And it did this without sacrificing the PSU's power rating. When the company says its PSUs hit a rating, dognab it, they do.

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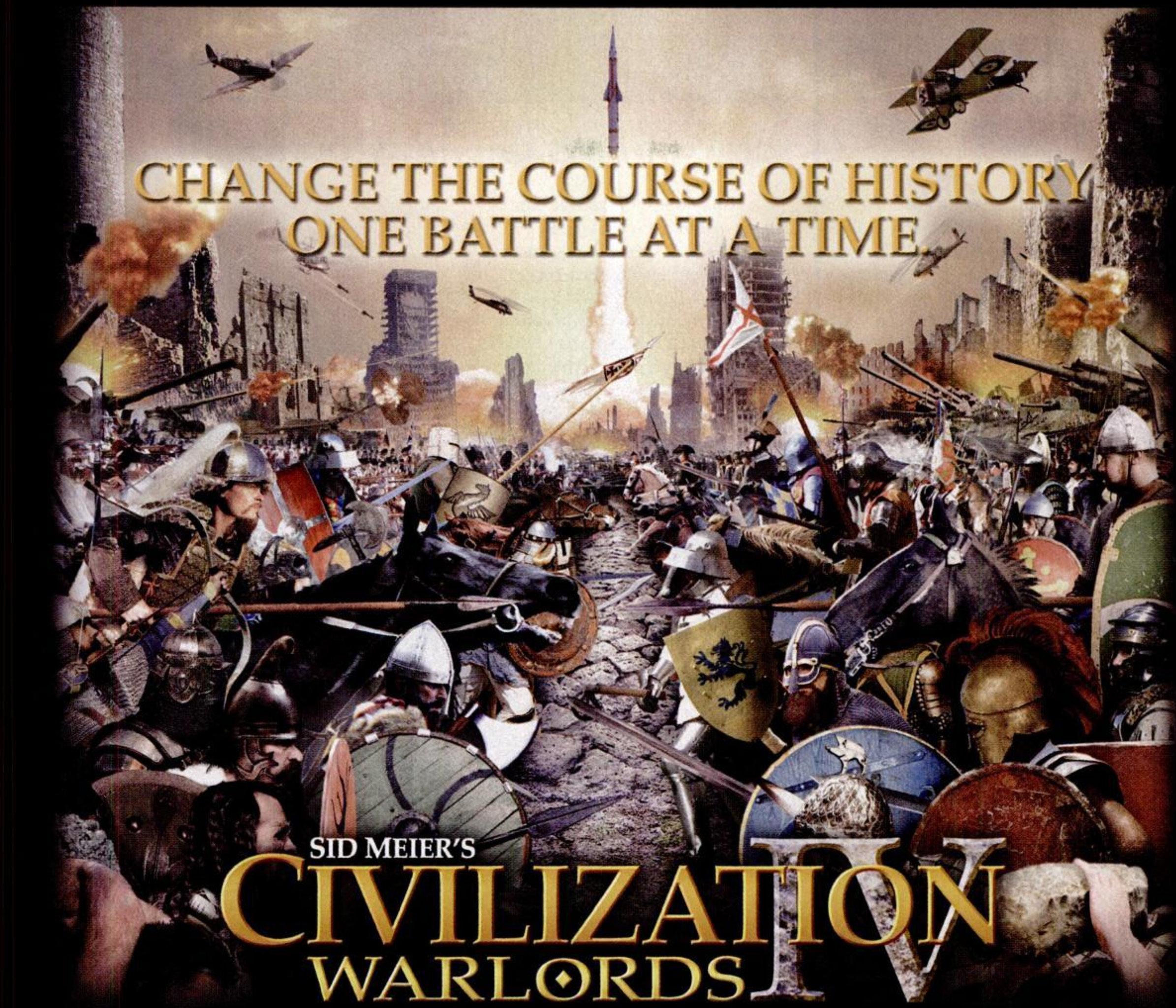

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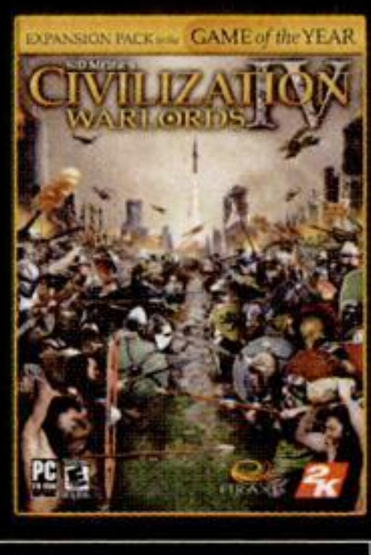

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PC CD-ROM SOFTWARE

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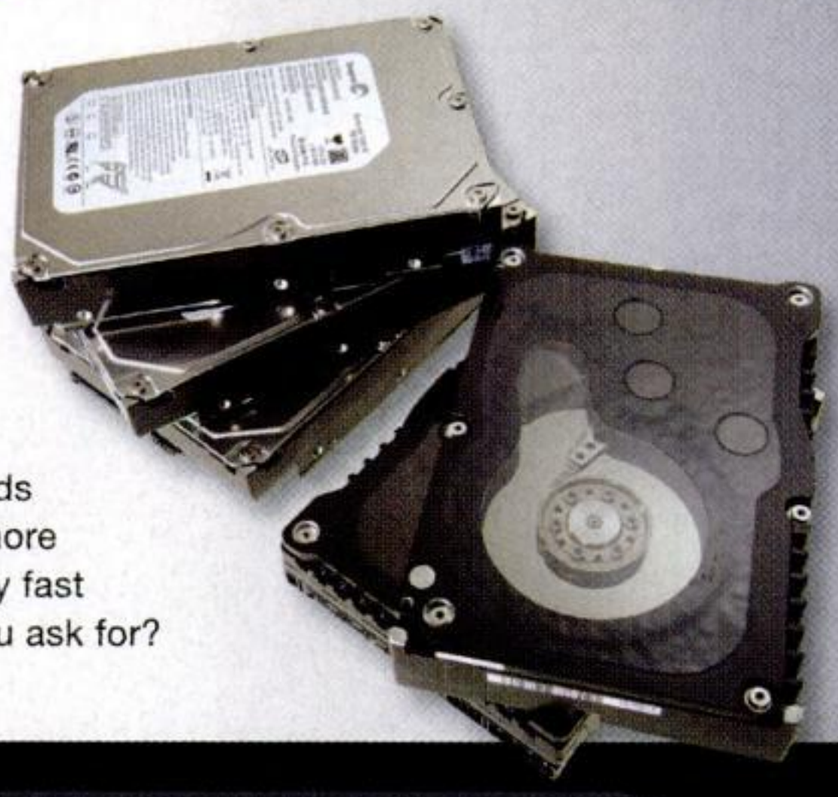
HARD DRIVES

Two WD Raptor 150GBs, three Seagate 7200.10 750GBs

The Dream Machine's storage config went through several iterations before we adopted the final "both of best worlds" approach. We originally considered six 10K Raptors in RAID 5 for 750GB of redundant storage. Sure, it'd be fast, but let's be honest—it doesn't pass Dream Machine muster. This is the ultimate rig. The Big Boy. *El Jeffe Muchacho.* Mere gigabytes ain't gonna cut it: We need *terabytes*, with a T. So we considered running six Seagate 750GB Barracudas. But that would have exceeded the 2TB volume limit in 32-bit Windows. Harumph.

So, finally, we decided to run a mix of both drives. The 10K drives for our boot sector, and the fatties for storage. The Raptors are configured in RAID 0 as a boot drive, and we're running three 750GB Barracudas in RAID 5 for 1.5 terabytes of redundant storage (we lose one of the drive's capacity to parity).

The final config is totally righteous. Our boot drive reads at 140MB/s, and we've got more than a terabyte of hellaciously fast storage. What more could you ask for?



OPTICAL DRIVES

Pioneer Blu-ray BVR-101A and Plextor PX-750UF

Recordable DVD is old and busted. High-definition optical storage is the new hotness. There's just one problem: You have to pick between the two competing standards, HD-DVD and Blu-ray. Because there will inevitably be differing alliances among movie studios, the only way we could ensure that our Dream Machine is fully high-def compliant would be to run both next-gen formats. Sadly, our fanciful vision didn't come to pass. We were able to procure a highly sought-after Blu-ray drive from Pioneer, but the HD-DVD drive we coveted was a no-show. Bummer.

At least we're rolling like next-gen archivists, able to burn 25GB to a Blue-ray disc. Sure, there are drawbacks to being this close to the cutting-edge: the $1,000 price tag is about as easy to swallow as ipecac, especially since the drive doesn't read from or write to CDs. To counter this flaw, we augmented the BVR-101A with an external Plextor PX-750UF 16X DVD-R for our CD-ripping and game-installation duties.

SOUNDCARD

Creative Labs Sound Blaster X-Fi Elite Pro

What would a Dream Machine be without a soundcard? One day we may have to answer that question, as more powerful features are offloaded to multicore CPUs, but today, we're not ready to give up the soundcard for onboard audio. Even as host-based audio gets more powerful, we can't abide audio integrated into the motherboard—there are just too many mobos that let the data moving across the board contaminate the audio signal. To get the cleanest audio available, we reached for Creative's Sound Blaster X-Fi Elite Pro. The über version of the X-Fi is more than a glorified break-out box. Creative actually redesigned the board and uses higher quality codecs to achieve a signal-to-noise ratio of 116dB—a healthy boost over the pedestrian X-Fi's already-excellent 108dB. The Elite Pro also includes a full 64MB loadout of onboard RAM (XtremeMusic includes just 2MB), which is supposed to increase the speed of gaming. Vinyl lovers also get a boost from the Elite Pro, which includes a circuit to compensate for the "RIAA" curve you run into when you try to digitize your album collection. Without compensation for the curve, your recordings would otherwise sound lifeless.

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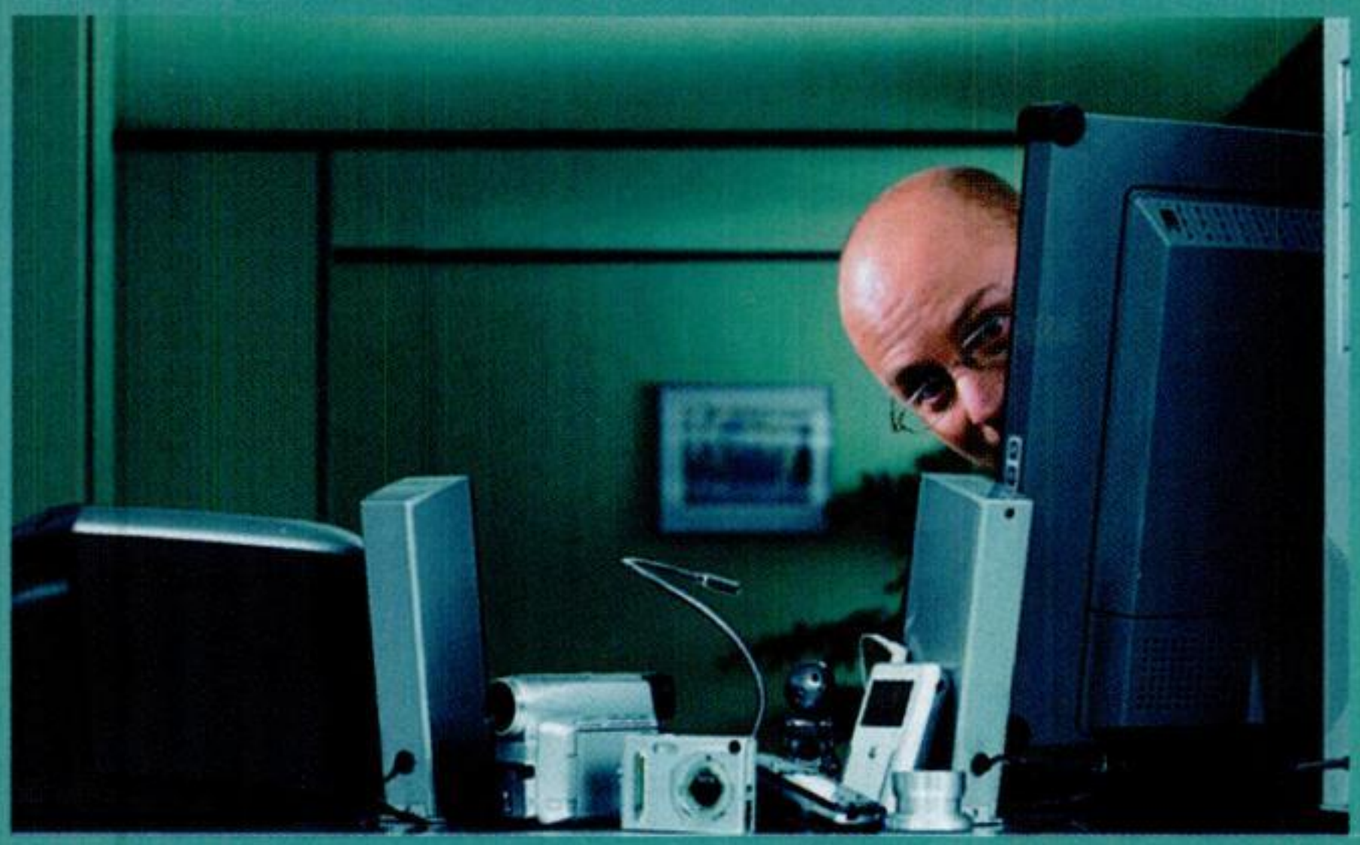

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- Code Name: Windsor
- Thermal Power: 65W
- L1 Cache: 128KB x 2
- L2 Cache: 1MB x 2

Athlon™64 X2 4600+* (Socket AM2)

- Part Number: 80727-9
- Code Name: Windsor
- Thermal Power: 65W
- L1 Cache: 128KB x 2
- L2 Cache: 512KB x 2

Athlon™64 X2 4400+* (Socket AM2)

- Part Number: 80726-9
- Code Name: Windsor
- Thermal Power: 65W
- L1 Cache: 128KB x 2
- L2 Cache: 1MB x 2

Athlon™64 X2 4200+* (Socket AM2)

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CASE AND PAINT

Silverstone TJ09 & Smooth Creations

One luscious chassis decked out to the nines, to make any geek's mouth water

You don't put Puff Daddy and his entourage up in a one-room studio for the night, and we sure as hell aren't going to put Dream Machine and all its glamorous hardware in anything less than the baddest, bitchinest enclosure available. This year, that enclosure is the soon-to-be-released Silverstone TJ09 full-tower. And even though the case was positively striking in stock trim, we went ahead and sent it to the wizards at Smooth Creations for a custom paint job. The result is a case so seductive it could easily be the centerfold in *Playrig* magazine, if there were such a thing.

The TJ09 has big shoes to fill, and it fills them admirably. We used its predecessor, the TJ07, for last year's Dream Machine, and it swallowed over $10K of hardware without flinching. The TJ09 is just as capable, despite being a tad smaller than its predecessor, and it's the only full-tower on the market that's new enough, big enough, and sexy enough to take on DM2006.

Naturally, it has all the dreamy requisite extras, including a slide-out motherboard tray, the copious cooling of five 12cm fans, and room for six hard drives, a PSU of any dimensions, and all our sundry other gear. The most interesting aspect of its design is the large ventilation chamber in the lower portion of the case, which allows cool air from outside to be sucked into the case's gaping maw via a 12cm fan positioned at the gap's entrance.

And the paint job? Well, what's to say other than that it costs $800 and is worth every cent. You truly have to see a Smooth Creations paint job in person to appreciate its profound wow-factor.

It all amounts to an enclosure that's as audacious as its innards.

SPEAKERS

M-Audio Studiophile LX4 5.1

Compromise is anathema when it comes to the Dream Machine, and that's why even the best high-end multimedia speakers didn't make the cut this year. There are speakers more powerful, there are speakers with more features, and there are speakers more consumer friendly; but there are no speakers more accurate than these.

Why does accuracy matter? The Dream Machine is the fastest machine we could build. Placing these speakers in the audio chain renders our PC as powerful for games as it is for home-studio, video-editing, and ripping-and-encoding applications.

The LX4's amp delivers 60 watts to the eight-inch subwoofer and 27 watts to each of the five satellites, which are equipped with 4-inch polypropylene midrange drivers and 1-inch Mylar tweeters (no paper cones here!). The bad news is that M-Audio has decided to discontinue these speakers without naming a replacement; the good news is that they remain widely available at retail—at least for now.

COOLING

Zalman CNPS9500 LED

We had a badass water-cooling kit from Danger Den locked and loaded for DM11, but the fact of the matter is, Conroe doesn't need water-cooling—it just doesn't get that hot. Instead, we went with Zalman's CNPS9500 LED heatsink, which keeps our Conroe chip chilly at all times, whether idle or under load.

Wazzat? You heard right: Using this cooler, we were unable to get the Conroe's temp to increase one iota under load. Incredible, no? Well dig this: We eventually unplugged the CPU fan and ran the processor at 100 percent load via *Nero Recode,* and the CPU temperature rose only three degrees Celsius. We repeat: We encoded an entire DVD, with both CPU cores at 100 percent, and with the CPU fan unplugged, and the machine ran stably for hours. Conroe's thermal performance is incredible, to say the least.

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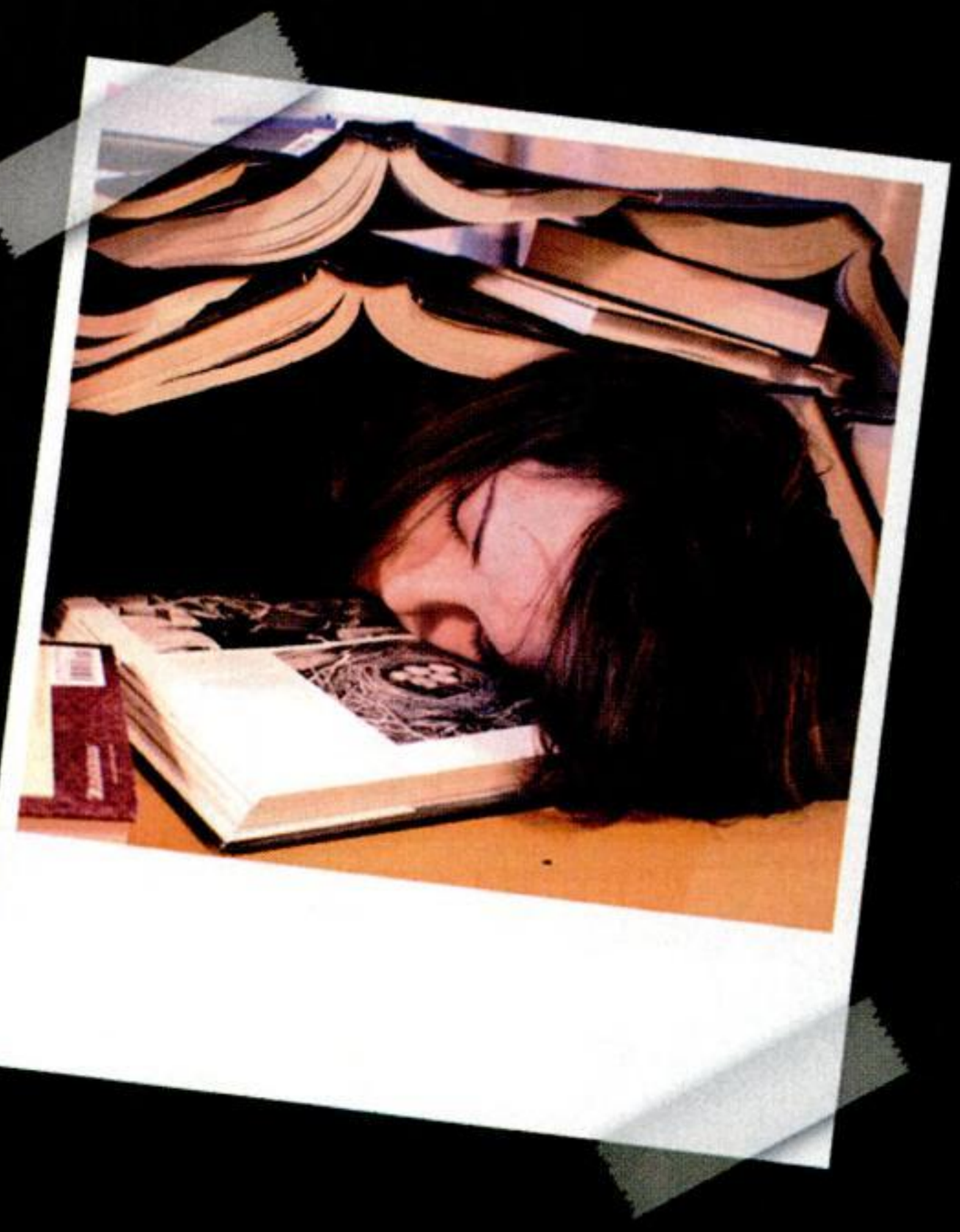

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IN YOUR DREAMS

A Dream Machine isn't complete without the perfect peripheral posse

MONITORS

With one of these Dell 2407WFPs set up directly in front of you, and the other off to one side, there's no end to the ways you can organize all the apps, windows, widgets, and what not you like to see on the screen at one time. This setup puts the *mmmmm* in multitasking.

MOUSE

The Logitech G5 represents the pinnacle of mousing perfection, with it's modular weight system, adjustable sensitivity sensor, and oh-so-comfortable four-button design. We wouldn't game with anything less.

CASE + PAINT JOB

The Silverstone TJ09 features an ingenious side-mounted air-duct. Rather than trying to suck air in and blow it through the drives, it pulls air over the drives, significantly improving internal airflow.

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What Does It Cost?

Perfection doesn't come cheap. This year's machine isn't our most expensive Dream Machine ever, but it's certainly not the cheapest either

CATEGORY	NAME	PRICE	URL
CPU	Intel Core 2 Extreme X6800	$1,000	www.intel.com
MOTHERBOARD	nVidia nForce 590 Intel Edition Reference Design	$250*	www.nvidia.com
VIDEOCARDS	2x XFX GeForce 7900 GTX XXX	$1,000	www.xfxforce.com
MEMORY	2x 1GB Corsair DDR2/800	$195	www.corsair.com
HARD DRIVES	2x Western Digital Raptor X 150GB	$500	www.wdc.com
	3x Seagate Barracuda 750GB	$1,500	www.seagate.com
OPTICAL DRIVES	Pioneer BDR-101A	$1,000	www.pioneerelectronics.com
	Plextor PX-750UF	$140	www.plextor.com
COOLING	Zalman CNPS9500 LED	$60	www.zalman.com
POWER SUPPLY	PC Power and Cooling Silencer 750	$200	www.pcpowerandcooling.com
SOUNDCARD	Creative Labs Sound Blaster X-Fi Elite Pro	$395	www.creative.com
CASE	Silverstone TJ09 Prototype	$250	www.silverstonetek.com
PAINT	Smooth Creations Custom	$800	www.smoothcreations.com
MONITORS	2x Dell 2407WFPs	$1,700	www.dell.com
SPEAKERS	M-Audio Studiophile LX4	$550	www.m-audio.com
KEYBOARD	Microsoft Ergonomic Keyboard 4000	$60	www.microsoft.com
MOUSE	Logitech G5	$50	www.logitech.com
OPERATING SYSTEM	Windows XP Professional	$200	www.microsoft.com
TOTAL COST		**$9,850**	

*We expect similar boards to be available for about $250.

KEYBOARD

When you spend as much time as we do with your keyboard, anything less than the best ergonomic design is just not an option. The Microsoft Ergo 4000 keyboard's reverse-slant design puts your fingertips below your wrists, for typing pleasure, even over extended gaming sessions.

SPEAKERS

The M-Audio Studiophile LX4 Surround Reference monitors pick up where powered multimedia speakers leave off. The 5.1-channel Studiophile LX4 effortlessly delivers audio with sonic precision that lesser speakers just can't match.

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Dreamy Speed

We said it's more than just a pretty face—Dream Machine 11 brings the heat

Besides its too-sexy-for-my-mobo paint job and next-gen components, this year's Dream Machine was born and bred for all-out speed in *today's* applications—not those on the horizon. Considering our powerfully refreshed zero-point machine and the spate of super-clocked, preened and pimped-out boxes we've reviewed in the last few months, we had to really push the limits to make our Dream rig shine.

Fortunately, the stars aligned to bring us Intel's new Core 2 Extreme X6800 CPU. If Intel chose the wrong fork in the road when it built the NetBurst microarchitecture (used in the Pentium 4), then the Core microarchitecture in the Core 2 Extreme slams the car into reverse and does a Jim Rockford-style high-speed 180.

In Dream Machine 11, The C2E, nForce 590 SLI mobo, dual-RAID arrays, and two GeForce 7900 GTX cards add up to, well, the fastest machine we've ever seen. Don't believe us? Peep our benchmark chart which compares Dream Machine 11 to the high-performance zero-point system we just erected in June. That was built with the best parts you could buy five months ago, but against Dream Machine 11, it looks mighty dated.

In *SYSmark2004 SE,* which tests how fast a machine is using more than a dozen applications (including Microsoft *Word, Excel, DreamWeaver* and *3dsmax*), Dream Machine destroyed the competition with a record score of 416. The next fastest machine is Monarch's Nemesis, which scored a puny 305 (August). Our zero-point system was stuck at 275 and BAPCo's own database shows Intel's previous top dog, the dual-core 3.73GHz Pentium Extreme Edition 965, bogged down at 292. The good news is that the Dream Machine didn't stop at *SYSmark*.

In our custom *Adobe Premiere Pro 2.0* benchmark, we add transitions to an HDV-resolution video and output it to Windows Media at 720p resolution. It's a punishing test, taking 50 minutes to create a three minute video on our 2.6GHz Athlon 64 FX-60. The Dream Machine almost cuts that time in half, finishing the video in about half an hour. That's 20 minutes given back to us by the goodness of this pure power PC.

Adobe Photoshop CS2 users also might consider building to our Dream Machine spec. In our custom action script, which starts with a RAW photo file before applying an ass-load of filters and effects to the image, we saw the Dream Machine finish the task almost 80 percent faster than our zero-point. When we pitted DM11 against the next-fastest rig we've tested, a 3GHz overclocked Athlon 64 FX-60 Overdrive rig that we reviewed in July, the Dream Machine ran 48 percent faster.

This year's Dream Machine also ran insanely fast on our punishing DVD-to-MPEG-4 conversion test. The previous record holder was Overdrive's overlocked 3GHz Athlon 64 FX-60, with a score of 952 seconds—the Dream Machine bested Overdrive's score by a whopping 25 percent. Wee haw!

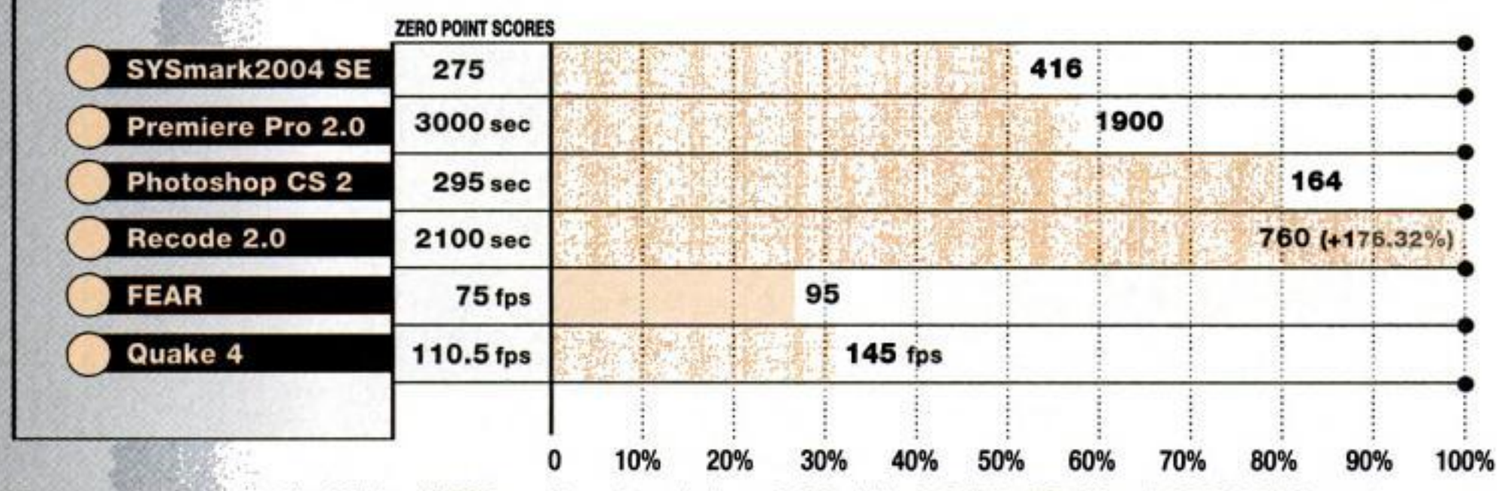
In gaming, we're pretty much looking at an even playing field. Almost every rig we've tested since June has featured a pair of GeForce 7900 GTX cards in SLI. The key difference is the clock speed of the cards. But even equipped with the same cards as lesser machines, this year's Dream Machine managed to hammer out double-digit performance increases. In *FEAR*, which mostly tests GPU performance, DM had an almost 27 percent performance advantage over our zero-point machine, but was slightly beaten by the quad-GPU Overdrive rig. In *Quake 4,* which features multithreading and is less GPU limited, Dream Machine 11 was 31 percent faster than our zero-point machine. Even better, we spanked the quad-SLI Overdrive rig by almost eight frames per second.

To recap, this year's Dream Machine walked into a room full of über-fast PCs and wiped the floor with them. DM11 now holds *five of six* benchmark records. Five of six, and most by a huge margin. Overdrive may have captured the *FEAR* title, but that wonky quad-SLI rig out-horsepowered our more efficient Dream Machine by a mere seven frames per second. In our opinion the performance benefits of a quad setup aren't worth the hassle, especially at standard resolutions.

Our goal with every Dream Machine is to build the fastest possible PC with the best components available. The benchmarks show that we've accomplished our mission. MPC

Thanks to the Core 2 Extreme CPU, DM11 now holds five of six benchmark records.

BENCHMARKS



Our current desktop test bed is a Windows XP SP2 machine, using a dual-core 2.6GHz Athlon 64 FX-60, 2GB of Corsair DDR400 RAM on an Asus A8N32-SLI motherboard, two GeForce 7900 GTX videocards in SLI mode, a Western Digital 4000KD hard drive, a Sound Blaster X-Fi soundcard, and a PC Power and Cooling Turbo Cool 850 PSU.

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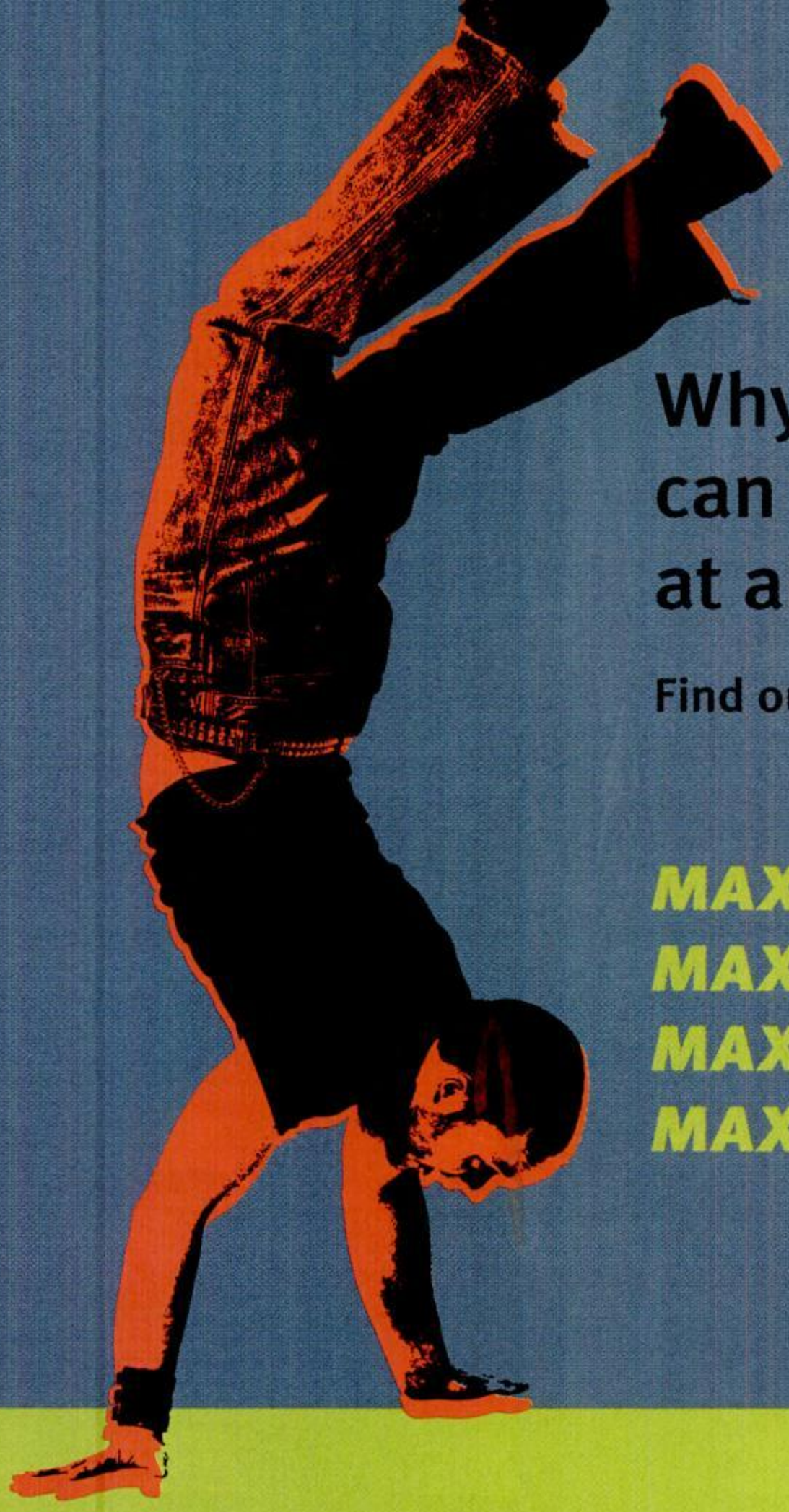

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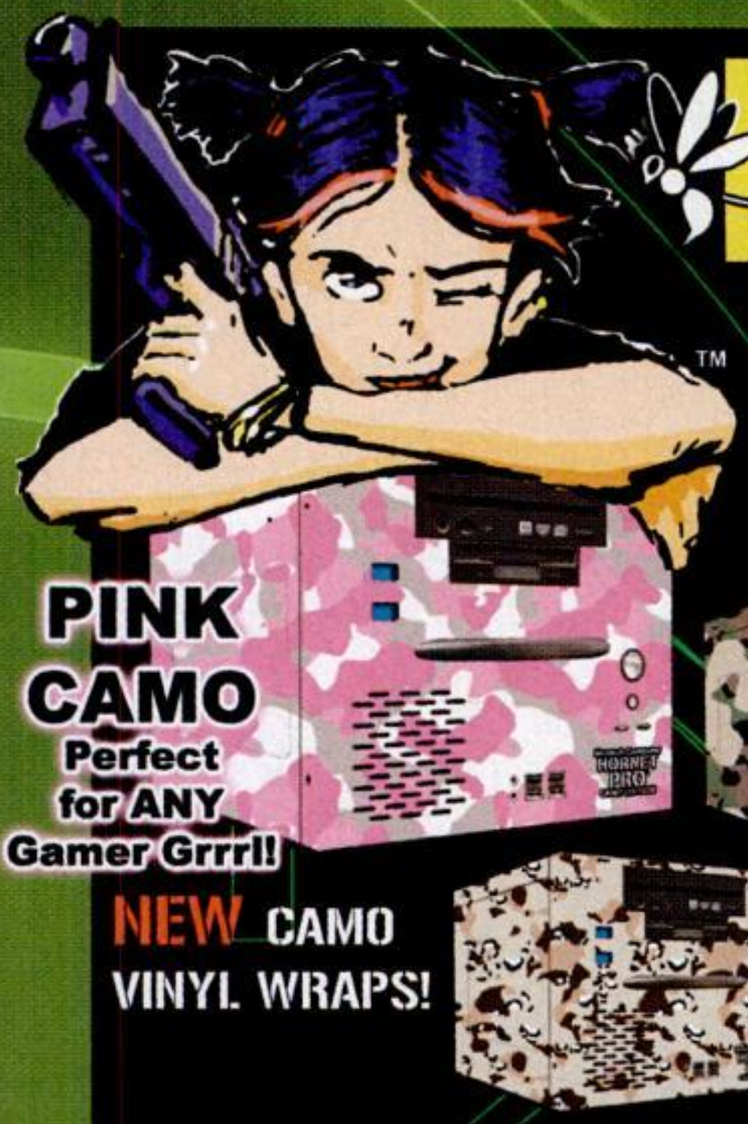

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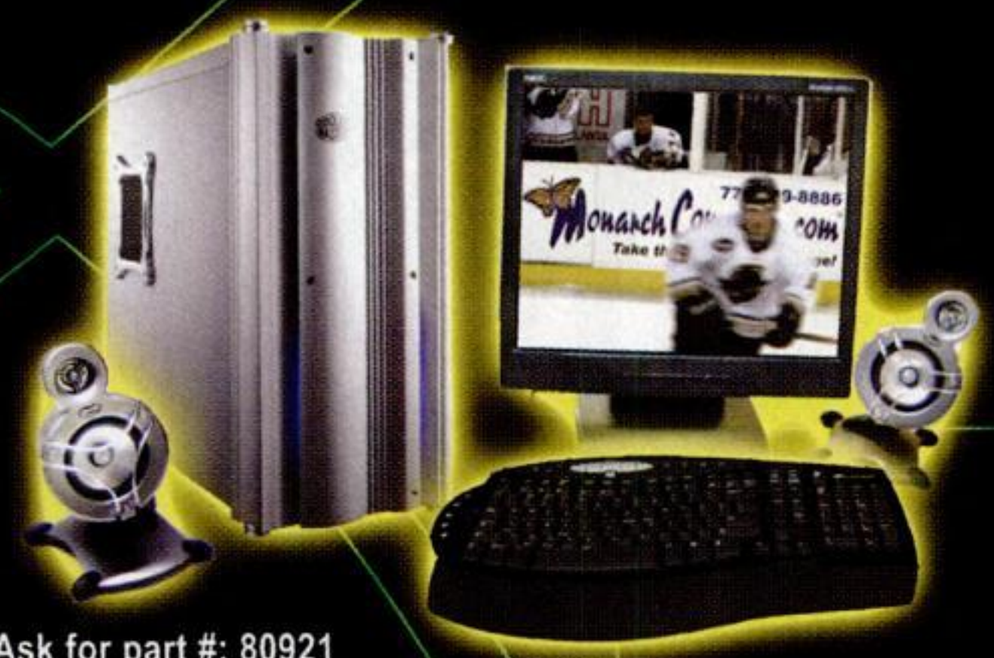

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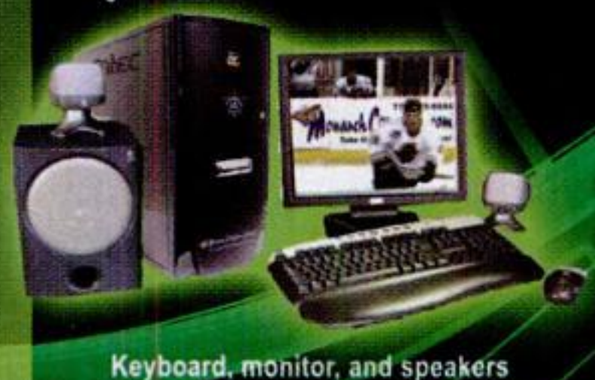

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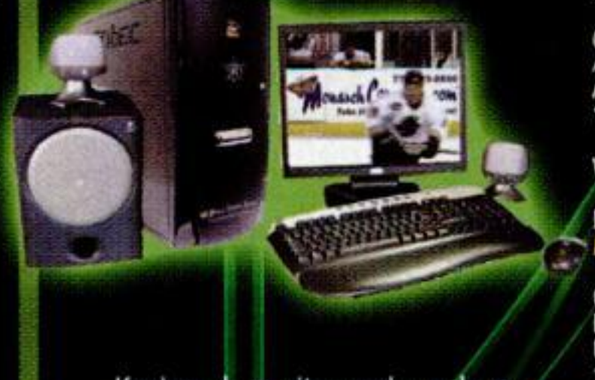

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BY PAUL LILLY

Picture this: It's late at night and you're sitting at your computer playing *Battlefield 2*, when suddenly, Windows freezes! Your game is gone, and you find a blue screen chock-full o' gibberish staring back at you. Windows is dead, Jim—at least until you reboot your rig. You have no choice but to sigh, shake your fist at Bill Gates, and angrily push the reset button. You've just been visited by the ghost of windows crashed: The blue screen of death.

Also known as the BSoD, the blue screen appears when core Windows components encounter a serious error—usually a crash or a lockup. The blue screen is actually a Windows "stop" screen, and it's designed to do two things: tell you what caused the error and calm your nerves, which explains the use of the color blue (studies show blue reduces stress). Blue screens are notoriously difficult to decipher—there are only a few different types of blue screen, but the same error message can indicate several different types of problem. Luckily, all the information you need to figure out the cause of your woes is right there in front of you in blue and white—and that's where we come in.

Flip the page to learn how to decrypt the most common errors, so you can get to the root of the problems causing your blue screen blues.

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BLUE SCREEN AUTOPSY

It's helpful if you get to know all the parts of a blue screen and what they mean. By default, WindowsXP is configured to automatically restart the system when it encounters a fatal error, making it difficult to decipher a blue screen's message. To put a halt to Windows' automatic reboots after errors, right-click My Computer, select Properties, and select the Advanced tab. Navigate to Startup and Recovery and click the Settings button. Under System Failure, uncheck the option labeled Automatically Restart.

```
A problem has been detected and windows has been shut down to prevent damage
to your computer.

PAGE_FAULT_IN_NONPAGED_AREA

If this is the first time you've seen this Stop error screen,
restart your computer. If this screen appears again, follow
these steps:

Check to make sure any new hardware or software is properly installed.
If this is a new installation, ask your hardware or software manufacturer
for any windows updates you might need.

If problems continue, disable or remove any newly installed hardware
or software. Disable BIOS memory options such as caching or shadowing.
If you need to use Safe Mode to remove or disable components, restart
your computer, press F8 to select Advanced Startup Options, and then
select Safe Mode.

Technical information:

*** STOP: 0x00000050 (0xEF8054AA,0x00000001,0x00000000,0x00000000)

Beginning dump of physical memory
Physical memory dump complete.
Contact your system administrator or technical support group for further
assistance.
```

ERROR NAME
There are many parts to a BSoD, but the most important element is right at the top. The name of the error is presented in all caps with an underscore between each word. In some cases this will be all that's needed to get to the root of the problem. Most of the time, however, more information is required.

TROUBLESHOOTING ADVICE
Nearly every BSoD includes a portion of text with some basic troubleshooting instructions, the first of which recommends restarting your computer. (Before you restart, copy the exact all-caps error name and hexadecimal values shown above and below this portion of generic text.) The next paragraph provides sound advice, alerting the user to ensure that all hardware is installed properly, or to undo any recent software or hardware upgrades.

MEMORY DUMP
Every BSoD is accompanied by a memory dump: When Windows crashes, it dumps whatever it's holding in system memory to a file, and saves the file on your hard drive for debugging purposes. If you contact Microsoft or a hardware vendor for technical assistance, they'll want to know the contents of this file.

STOP CODE
The "technical information" portion contains the actual Windows stop code, in the ever-so-user-friendly hexadecimal format. Despite its unintelligible appearance, this combination of numbers and letters is instrumental in determining the cause of the crash. Pay particular attention to the first set of numbers and letters. It precedes the four that are enclosed in parenthesis. If a specific driver is associated with the crash, it will be listed on the very next line.

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IRQL_NOT_LESS_OR_EQUAL (0x0000000A)

This most common of errors typically indicates a driver problem

The most common cause of this blue screen is improperly installed drivers for a newly installed piece of hardware. For example, if you installed a webcam two weeks ago, and have been getting BSoDs ever since, start your investigation with the webcam. First, disconnect the hardware, and uninstall the drivers for it completely. If that fixes the blue screen, you can search for updated drivers or contact the manufacturer.

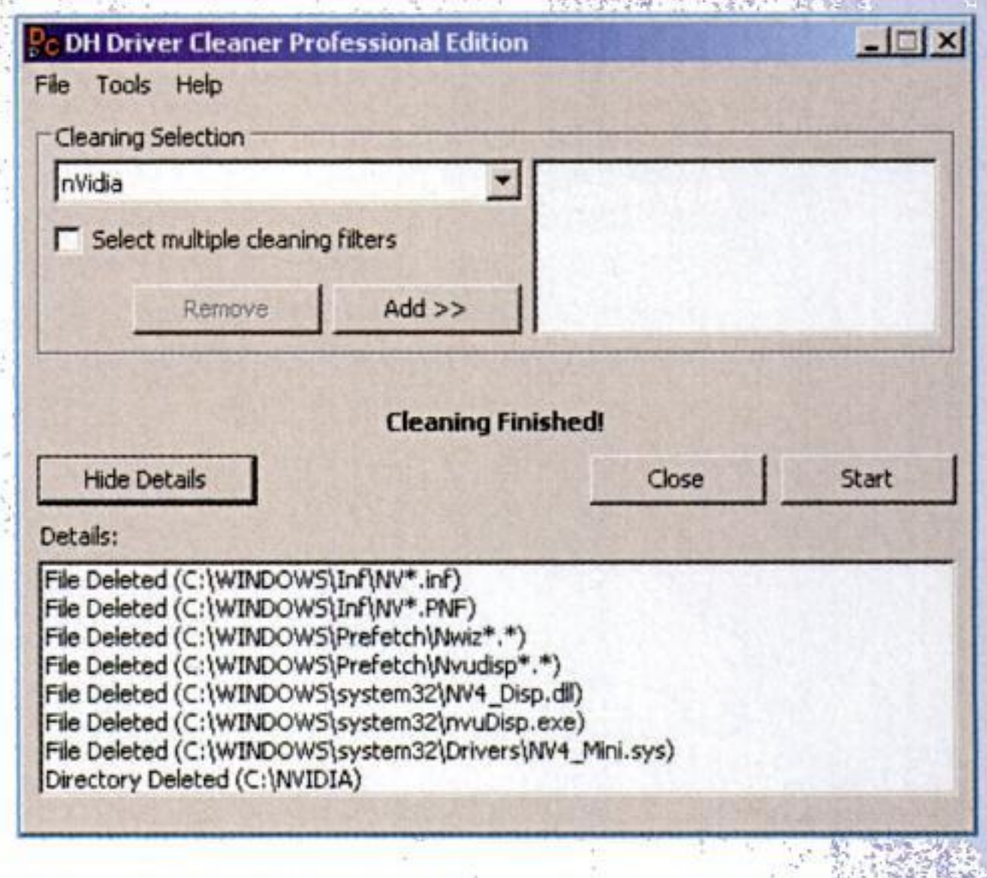
If you haven't installed any new drivers recently, you'll need to do some more detective work. Start by examining the blue screen to see if it lists a specific driver. (See the instructions on the previous page, to capture your blue screen's information.)

Looking at the blue screen, check the text at the very bottom of the screen. You'll probably see a file name. This is the driver that caused the problem. If, for example, the driver in question is named nv4_disp.dll (an nVidia-related file), and you've recently switched from an nVidia videocard to an ATI, then it's reasonable to assume that either the old driver was not uninstalled correctly, or the new drivers weren't properly installed.

SWAPPING VIDEOCARDS

If you've narrowed your search of offending drivers down to those associated with you videocard, turn off the system, disconnect the power, and remove and reseat the videocard. Next, go into the BIOS (press F2 or Delete when your BIOS prompts you to do this) and check the bus speed for your videocard (either AGP or PCI Express, depending on your rig's hardware). The AGP bus should be locked at 33.33MHz, and the PCI-E bus should be cruising along at 100MHz. If you've overclocked your system, it can inadvertently knock these bus speeds beyond a stable spec, which can cause blue screens.

Users are more likely to experience this IRQL error when switching from one videocard brand to another, as the drivers will conflict with each other. The safe way to swap videocards is to completely remove all remnants of your old videocard drivers using a free utility called *Driver Cleaner* (**www.drivercleaner.net**). To begin the process, click the Start menu and open the Control Panel. Double-click the Add or Remove Programs icon, highlight the videocard drivers, and click Remove. Reboot the computer, holding down the F8 key to enter safe mode. Run the *Driver Cleaner* utility to scrub away any remnants of the previous drivers that a typical uninstall overlooks. After you reboot, install the appropriate drivers for your new videocard.



When you install a new videocard, use *Driver Cleaner* to completely wipe the driver remnants from your previous card off your system.

SOME SOUND ADVICE

When the error is related to an audio driver, take note of the program that was running when the BSoD occurred. Make sure the offending application's sound options are configured correctly—it's especially important that it uses the correct audio device–and download any patches available that address known issues. You should update your soundcard's drivers as well.

If you're using an add-in soundcard, verify that the motherboard's onboard audio is disabled in the BIOS, so the two audio drivers don't conflict with one another.

CHANGE DOCTORS

System services known to cause this error include virus scanners and backup utilities. We've had good luck with *AVG, Norton, Kaspersky*, and *Nod32* for our antivirus scanning, and *Norton Ghost* for backup duties. Do not run more than one antivirus application on your computer at a time!

DATA_BUS_ERROR (0X0000002E) *This is what happens when good chips go bad!*

This is one of the easier BSoDs to diagnose, as faulty memory sticks are almost always to blame. If you get this error, think for a second: Are those DIMMS you just added compatible with your motherboard? Your motherboard manufacturer's website will have a list of specific brands verified to work with your particular board. Next, are they installed in the correct slots? Some motherboards are more finicky than others when it comes to proper slot placement, and the situation is compounded when dealing with a dual-channel-capable board. Most motherboards that run dual-channel require that you install matching sets of RAM in the same-color slots, while others, such as MSI, require that you install them in alternate slots.

Once you've verified that your RAM is installed correctly and is compatible with your motherboard, then the problem is likely a bad stick. To find out which stick is bad you can simply remove one stick, then run your system for a while to see if the blue screens stop. Then swap the sticks and run your test again. If the machine blue screens with one stick, but not the other, you've found your culprit. You can also run a diagnostic program such as *Memtest86* (see sidebar next page) to help determine which stick is defective. Because most RAM sold today includes a lifetime warranty, be sure to check with your vendor before you toss out a bad stick.

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NTFS_FILE_SYSTEM or FAT_FILE_SYSTEM (0x00000024 or 0x00000023)

File system errors are relatively easy to pinpoint, but time-consuming to repair

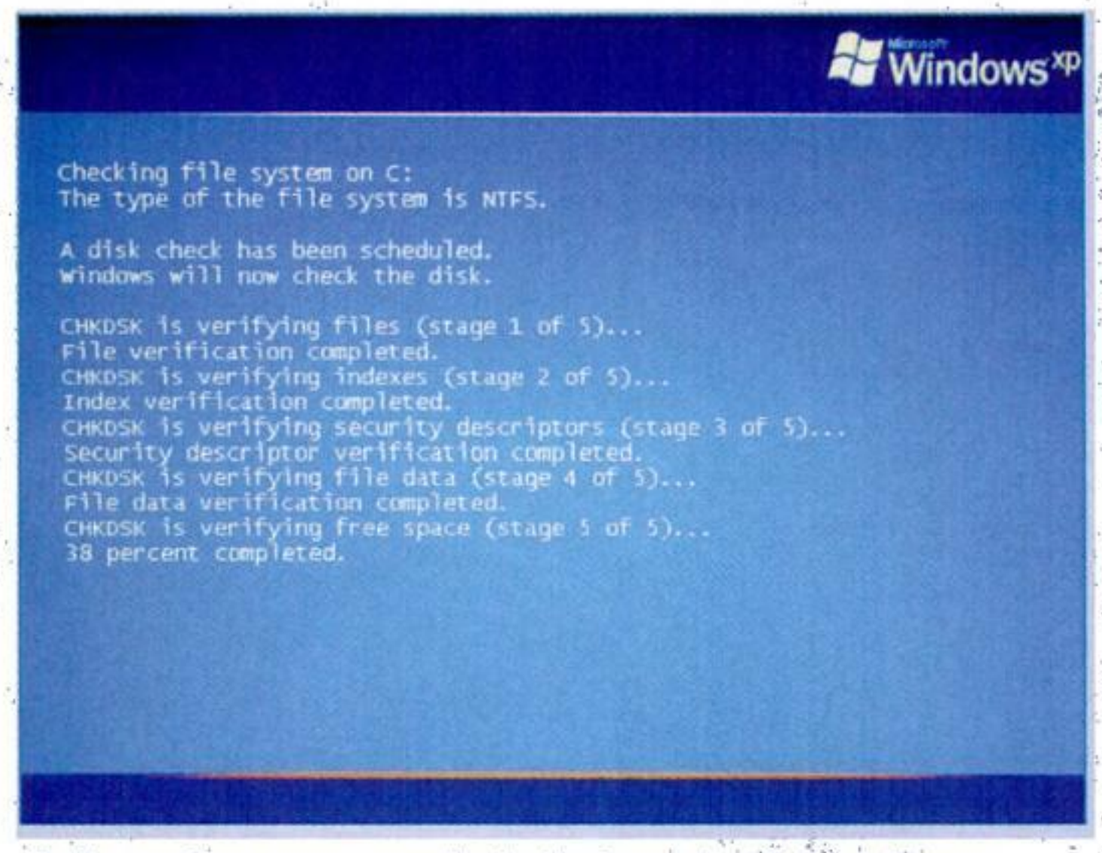
While many blue screens can be traced back to a new hardware install or bad memory, this particular error screams in capital letters that something is fishy with your hard drive. The error that gets displayed depends on the file system your OS is using. In most cases, the file system will be NTFS. With really old systems, the error will read FAT16. If you get this error, be sure to do one thing immediately, before you even begin to contemplate its cause: Back up your important data.

CALL THE CABLE GUY

The easiest solutions are often the most overlooked, but they can also be the most effective. Checking your hard drive's cable connections falls into this category. SATA cables are notorious for working themselves loose—we've had this happen to us on many occasions. Make sure the cable plugs securely into both the hard drive and the motherboard, and check the power cable connection as well. If using a SATA drive, make sure you have only *one* power cable connected, not two (many SATA hard drives include a SATA power cable and a legacy four-pin connector). With a PATA drive, remove the ribbon cable and look for any bent or broken pins. Carefully line up the cable and push it securely into place. You might also have a bad cable, so if you have a spare cable lying around—one you know to be good—swap it with the one in your PC.

CHECK PLEASE!

Now it's time to check your drive for errors. To do this, we'll first run a diagnostic scan. Click Start, then Run, and type `cmd`. This brings up a command prompt. At the flashing command prompt, type `chkdsk /f /r` and reboot the system if prompted. The /f and /r switches attempt to fix file-system errors, then look for and mark any bad sectors before automatically rebooting when the scan completes.


Windows xp
Checking file system on C:
The type of the file system is NTFS.
A disk check has been scheduled.
Windows will now check the disk.
CHKDSK is verifying files (stage 1 of 5)...
File verification completed.
CHKDSK is verifying indexes (stage 2 of 5)...
Index verification completed.
CHKDSK is verifying security descriptors (stage 3 of 5)...
Security descriptor verification completed.
CHKDSK is verifying file data (stage 4 of 5)...
File data verification completed.
CHKDSK is verifying free space (stage 5 of 5)...
38 percent completed.

A file-system error usually indicates a hard drive issue. Use Windows' chkdsk to find and fix any problems.

CHANGE DRIVERS

Even though we don't really think about hard drives as needing drivers, the controller's they're attached to most certainly do. A buggy SATA controller driver can wreak havoc on your data. Your motherboard's chipset drivers include specific drivers for the IDE/ATA controller that the hard drives are connected to, so you'll need to install the latest version for your motherboard. To find your chipset drivers, you'll need to go to your motherboard manufacturer's website and search the support section, or head directly to your chipset manufacturer's website.

MY RAM'S BEEN RANSACKED! *Diagnose a faulty stick of RAM with Memtest86*

Using a defective stick of RAM is one of the quickest ways to generate a BSoD. No memory vendor is immune from the occasional bad chip, but purchasing name-brand RAM is a surefire way to reduce this risk, and to guaranty an easy exchange if you encounter problems.

To run *Memtest86*, download the software from www.memtest86.com. Once installed, use it to make a bootable CD-ROM using *Nero* or another CD mastering program. Insert the newly burned CD-ROM into the PC and reboot your PC (you might need to go into the BIOS and change the boot order so that it boots off of the optical drive).

***Memtest* will run on its own when the system restarts. We recommend letting it run for at least two passes, and ideally overnight. The program will test whatever RAM is installed, so install one stick of RAM at a time for testing. If no errors are found, install the other stick into a different slot and run the test again. You can also move a "good" stick of RAM to different slots to ensure that the slots themselves are functional. Though uncommon, it's entirely possible for a DIMM slot on a motherboard to go bad and the symptoms are virtually identical to bad RAM.**

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UNEXPECTED_KERNEL_MODE_TRAP (0x0000007F)

Appropriately named, but we view all BSoDs as unexpected

If you see this blue screen, you're probably overclocking your CPU, but this is not always the case. The 7F error is known to attack indiscriminately, lashing out at more than just overclockers. This particular BSoD can rear its head in response to bad RAM, a faulty motherboard, or a corrupted BIOS.

OVERZEALOUS OVERCLOCKING

If you've overclocked, the first thing you should do to isolate the problem (or any problem, for that matter) is to revert your overclocked components to their default speeds. If the blue screen goes away, then your overclock was too aggressive. The best way to ensure that your overclock is stable is to stress the hell out of your PC. To do this, many enthusiasts turn to the torture test named *Prime95*, a free utility found at **www.mersenne.org**. This utility stresses your rig's CPU and memory subsystems. If any errors are found, it's a good indication that your system is not completely stable.

HOT POTATO!

This BSoD could also be generated by an overheating PC, so it's a good practice to monitor your system temps on a regular basis. Most of the machines in our Lab are outfitted with *Speedfan*, a utility capable of both monitoring and adjusting fan speeds based on system temperatures. It's available at **www.almico.com/speedfan.php** (see the How2 section in the July 2006 issue for more info).

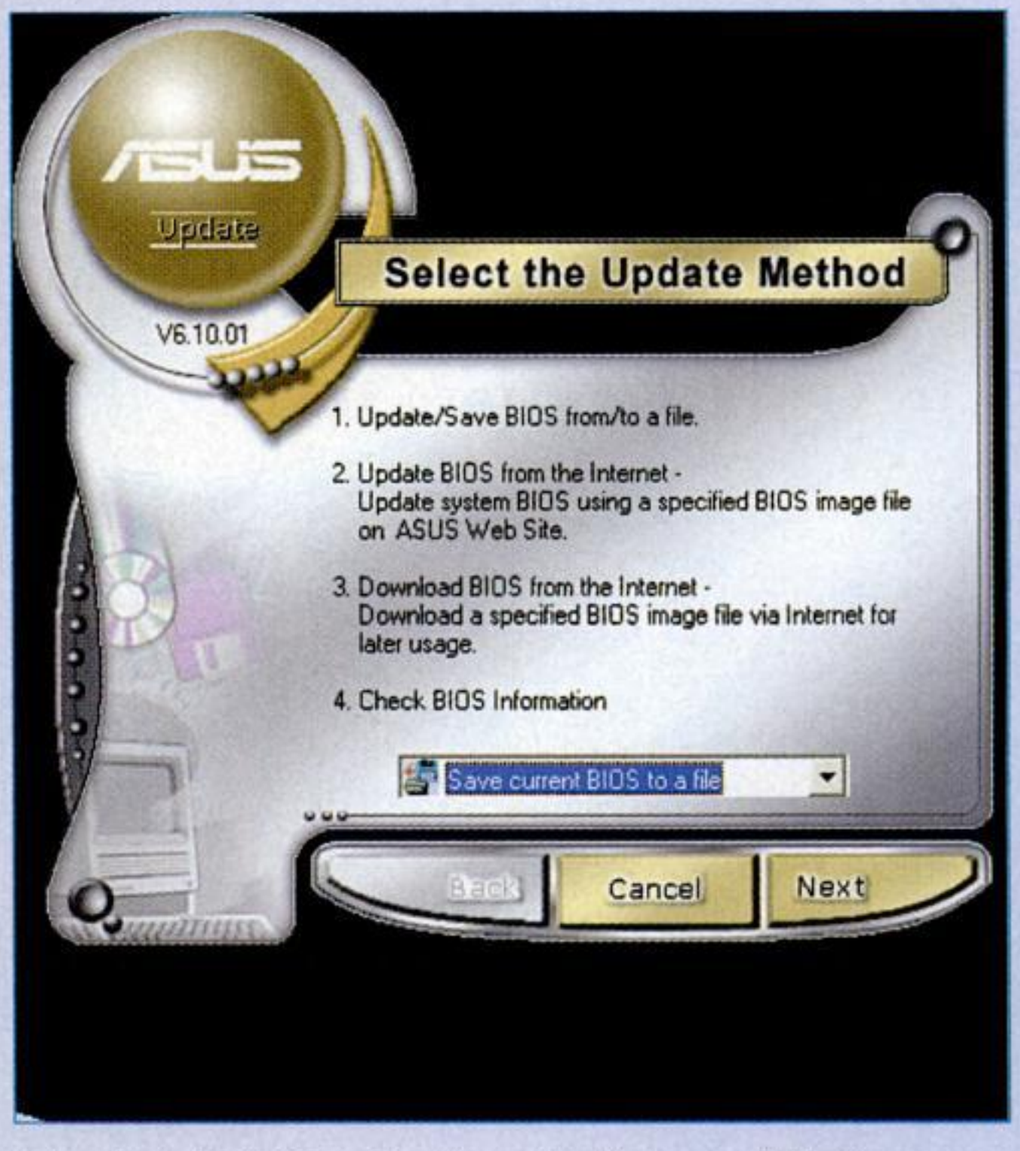
As far as temperatures go, most CPUs can get very hot without incurring any damage. Temperatures of 75 C aren't unheard of for hot-running CPUs. In general, it's a good idea to keep your CPU below 60 C at all times.

If a processor is running hot, examine your case's airflow and see if there are any obstructions. Check your fans for dust buildup, including the top of the heatsink that's cooling your CPU. A high-quality cooler will also bring temperatures down. And you should always have some sort of thermal paste between the CPU and the cooler. Finally, verify that all fans are spinning. If the fan is plugged in and still not spinning, replace the defective fan immediately.

THE BIOS BECKONS

If your BIOS is corrupt or has trouble with a new component, such as a newly released processor core, your first order of business is to update to the latest version. Before updating the BIOS, you should change its settings back to default (there is usually a "reset to default" setting in the BIOS that makes this process easy, or you can simply clear the CMOS via the jumper on your motherboard). You should never attempt to update your BIOS on a system that is overclocked and unstable. A sudden reboot in the middle of the BIOS-flashing process will destroy your motherboard, turning it into a fancy doorstop. And remember: Never, under any circumstances, restart or shut down the system while you're flashing your BIOS. You can download the latest BIOS from your motherboard manufacturer's website.

When there are several different versions to choose from, skip right to the latest release rather than updating incrementally. Some motherboard vendors include utilities for updating the BIOS from within Windows. This makes the process easy enough for even novices to undertake, but for obvious reasons, we recommend avoiding this route when a system is prone to blue screens.


ASUS
Update
V6.10.01
Select the Update Method
1. Update/Save BIOS from/to a file.
2. Update BIOS from the Internet -
Update system BIOS using a specified BIOS image file on ASUS Web Site.
3. Download BIOS from the Internet -
Download a specified BIOS image file via Internet for later usage.
4. Check BIOS Information
Save current BIOS to a file
Back
Cancel
Next

The Asus A8N32 motherboard includes a utility for flashing the BIOS within Windows. It's much easier than using a floppy drive, but you shouldn't use this utility if Windows is prone to blue screens.

MATING MEMORY

Mismatched or bad memory sticks can also cause this blue screen. To scratch this one off of the troubleshooting list, run a single stick of RAM that *Memtest86* has verified to be error free. If this solves the problem, replace the bad stick. If not, move on to the next step.

CPU IS KAPUT

We don't see this often, but another known cause for this particular error is a bad processor. Most people don't have the means to test the CPU in another system, so your options here may be limited. Local computer repair shops are sometimes willing to run the processor for a night or two for a nominal cost, but you can also contact AMD or Intel for a replacement if it's within the warranty period.

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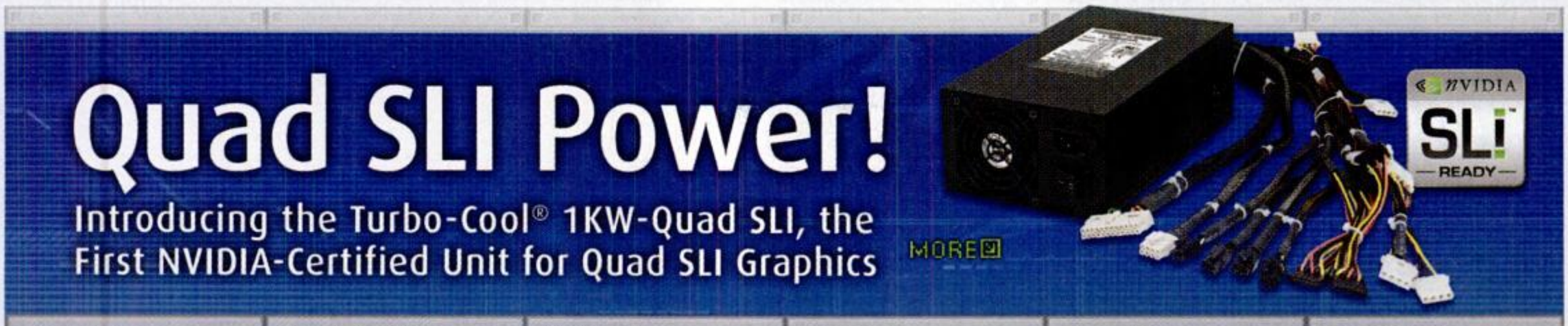

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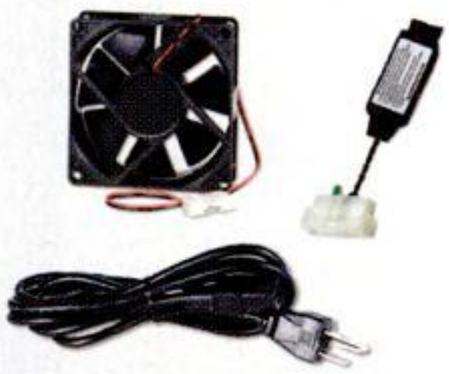

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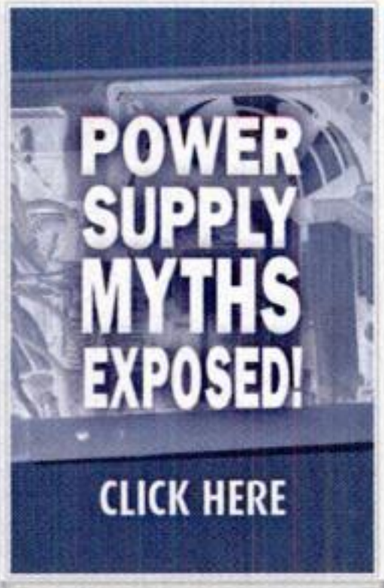

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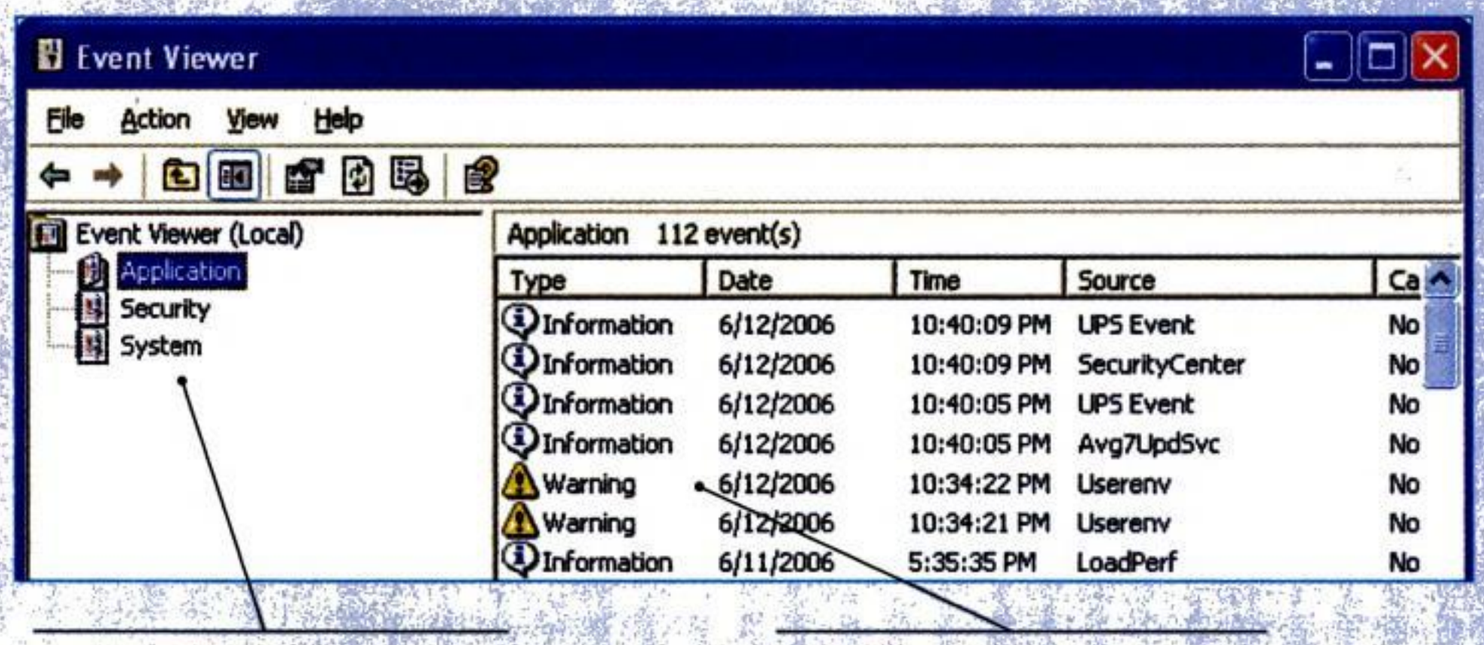
An End Run around the BSoD

If you don't want to bother with decrypting a blue screen, it's time you learned about the Event Viewer


Event Viewer
File Action View Help
Event Viewer (Local)
Application
Security
System
Application 112 event(s)
Type Date Time Source Ca
Information 6/12/2006 10:40:09 PM UPS Event No
Information 6/12/2006 10:40:09 PM SecurityCenter No
Information 6/12/2006 10:40:05 PM UPS Event No
Information 6/12/2006 10:40:05 PM Avg7UpdSvc No
Warning 6/12/2006 10:34:22 PM Userenv No
Warning 6/12/2006 10:34:21 PM Userenv No
Information 6/11/2006 5:35:35 PM LoadPerf No

The Event Viewer contains three logs: Application, Security, and System. An application log records events from specific programs. Everything about these logs is determined by the programmers for the given application and not by Windows. The security log records events that have to do with system security, such as logon attempts and proper or improper use of resources. Finally, the system log records items such as system drivers and other Windows-only system components.

In the right-hand pane are the actual events being recorded. Most of these are harmless and easily ignored, but for a system on the fritz, it would be silly to overlook any warnings or errors. If there are several errors, you can save them to a handy text file for easier viewing, by highlighting one of the three logs and selecting Export List from the Action drop-down menu.

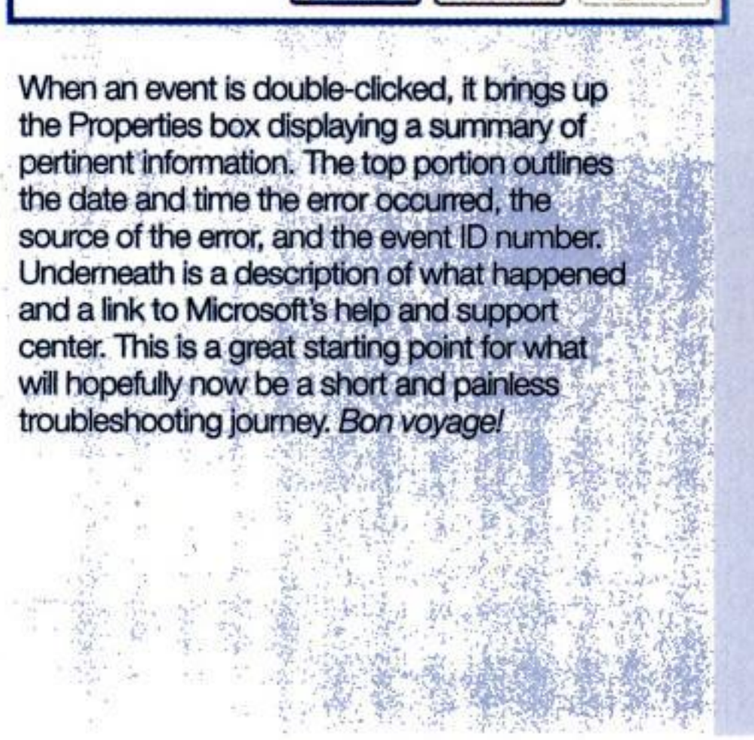
Reading blue screens of death is fun, but there's another, easier way to discover what your PC's problem is: the Event Viewer. When an error occurs in Windows, the OS adds a note to the system's log files. These logs are accessible through Windows' Event Viewer, and they contain all the information we need to know what ails our poor computer.

To get started, go to the Start menu and open the Control Panel. Click Administrative Tools, then double-click the Event Viewer icon. Alternately, select Run from the Start menu and type `eventvwr.msc`, which will bring you right into the Event Viewer.

On the left-hand pane, highlight the application or system icon. On the right-hand pane, you'll see up to three different events labeled Information, Warning, and Error. These are sorted by the time in which they occurred. Scroll to the approximate time of the last system restart and double-click the events. This brings up a Properties window detailing information that should clue you in on any problem. For example, if one of the events contains a bugcheck message with the code 0x0000002E, we know this is a DATA_BUS_ERROR, and is usually indicative of faulty RAM. On the other hand, there might be several events pointing to a specific driver, such as nv4_disp.dll. This tells us we should focus on the videocard and any recent changes related to the display hardware.

Armed with this information, we're ready to begin the troubleshooting steps outlined on the previous pages. If typing the event ID into Google (**www.google.com**) and Microsoft's Knowledge Base (**http://support.microsoft.com**) doesn't help, head over to **www.eventid.net**. This site contains a repository of comments and errors from other users, as well as the steps they took to alleviate their problems.

We recommend you familiarize yourself with the event viewer, even if your system is healthy. Rooting out minor problems before they progress will ensure your Windows install keeps humming along uneventfully. MPC


Event Properties
Event
Date: 6/12/2006 Source: Application Error
Time: 12:16:22 PM Category: None
Type: Error Event ID: 1000
User: N/A
Computer: JOSHNOREM2
Description:
Faulting application nero.exe, version 7.0.0.0, faulting module bcgcbpro730.dll, version 7.30.0.0, fault address 0x0011d51b.
For more information, see Help and Support Center at http://go.microsoft.com/fwlink/events.asp.
Data: Bytes Words
0000: 41 70 70 6c 69 63 61 74 Applicat
0008: 69 6f 6e 20 46 61 69 6c ion Fail
0010: 75 72 65 20 20 6e 65 72 ure ner
OK
Cancel
Apply

When an event is double-clicked, it brings up the Properties box displaying a summary of pertinent information. The top portion outlines the date and time the error occurred, the source of the error, and the event ID number. Underneath is a description of what happened and a link to Microsoft's help and support center. This is a great starting point for what will hopefully now be a short and painless troubleshooting journey. *Bon voyage!*

And the others...

Brief descriptions of the other BSoDs

PAGE_FAULT_IN_NONPAGED_AREA: Faulty hardware, including RAM (system, video, or L2 cache).

INACCESSIBLE_BOOT_DEVICE: Caused by improperly configured jumpers on PATA hard drives, a boot sector virus, or incorrect IDE controller drivers, which can also occur when installing the wrong chipset drivers.

VIDEO_DRIVER_INIT_FAILURE: Caused by installing the wrong drivers for a videocard, or rebooting before driver installation could complete.

BAD_POOL_CALLER: Caused by a faulty or incompatible hardware driver, particularly when upgrading Windows XP instead of performing a clean install.

PFN_LIST_CORRUPT: Caused by defective RAM.

MACHINE_CHECK_EXCEPTION: A bad CPU—or one that is too aggressively overclocked, or an underpowered or faulty power supply.

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"Prey looks like one of the best first-person shooters of the year in both graphics and gameplay." – IGN

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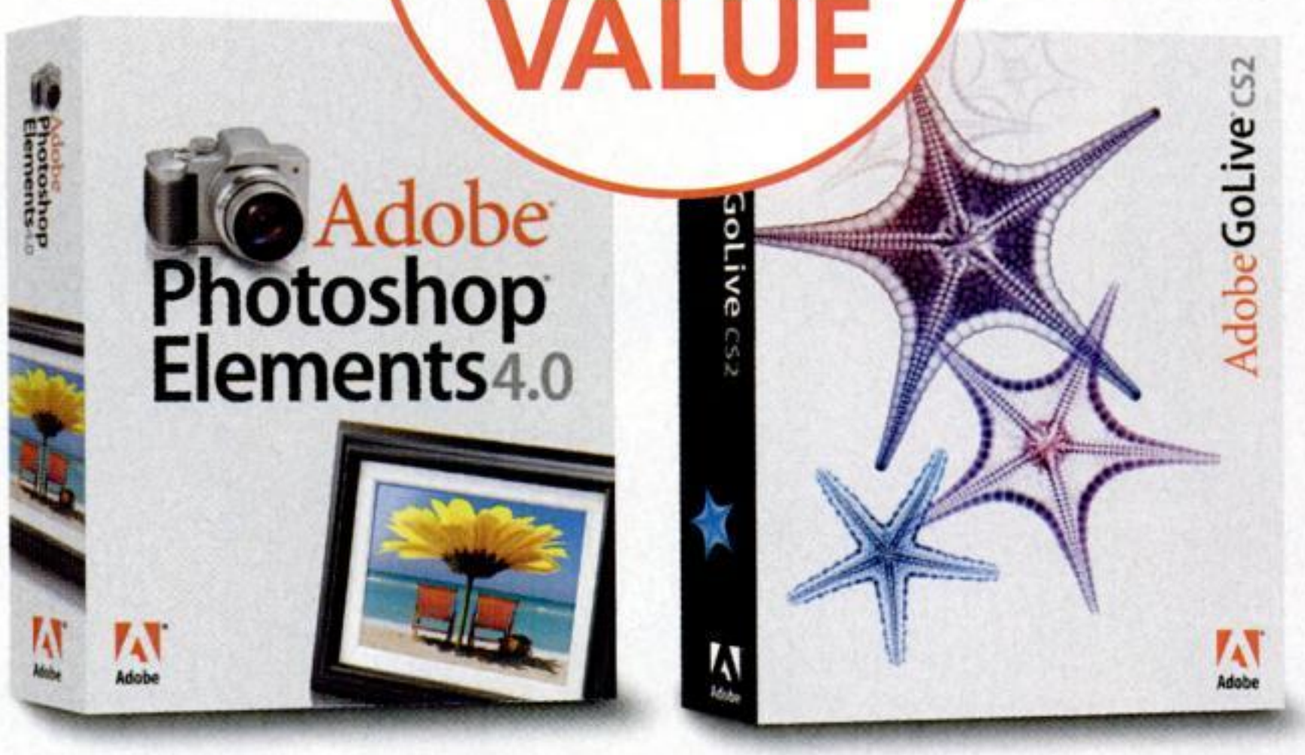

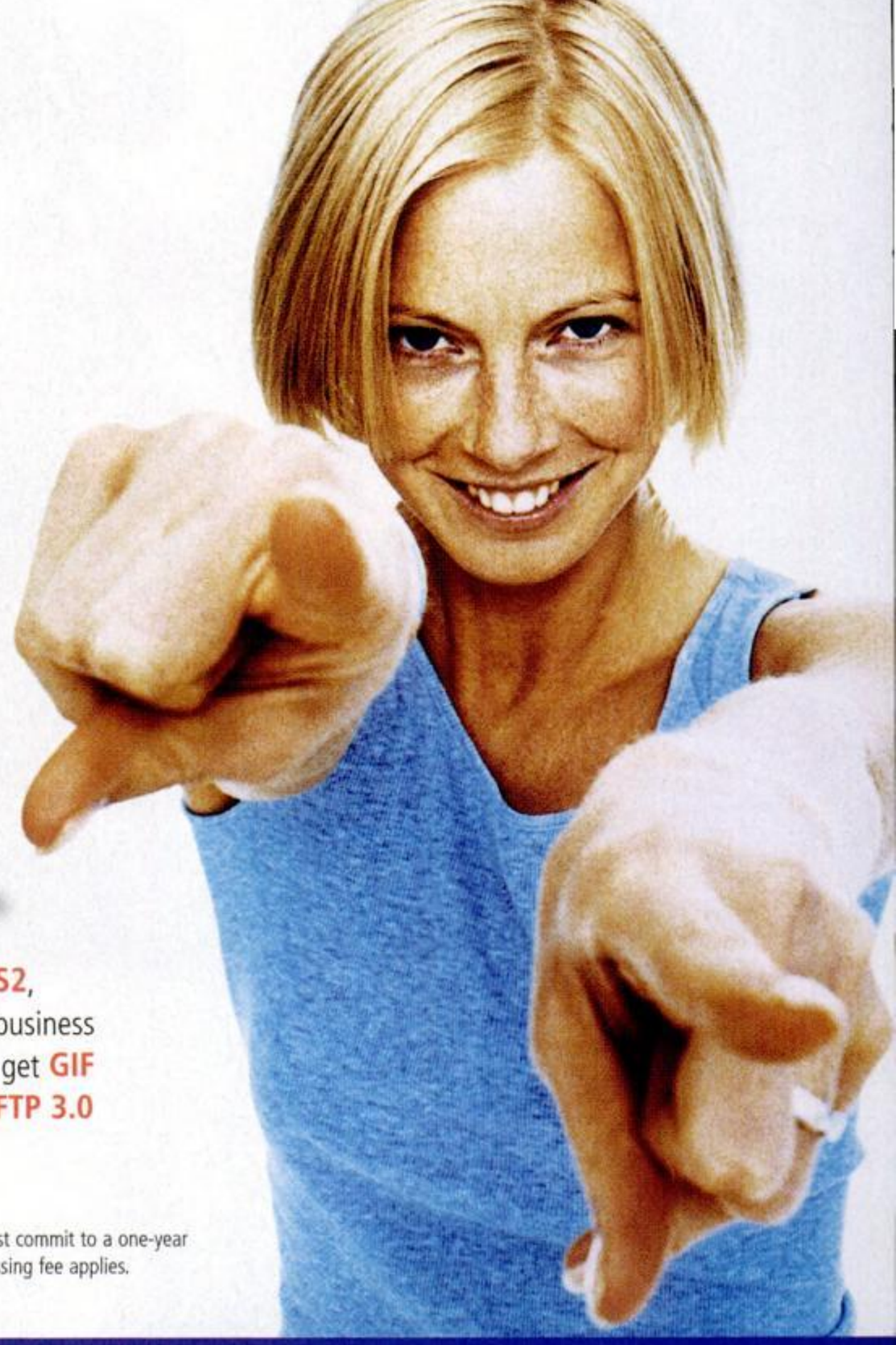

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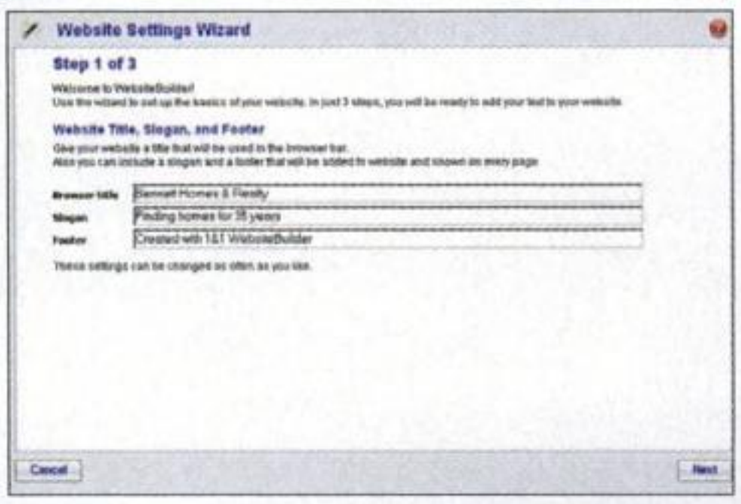

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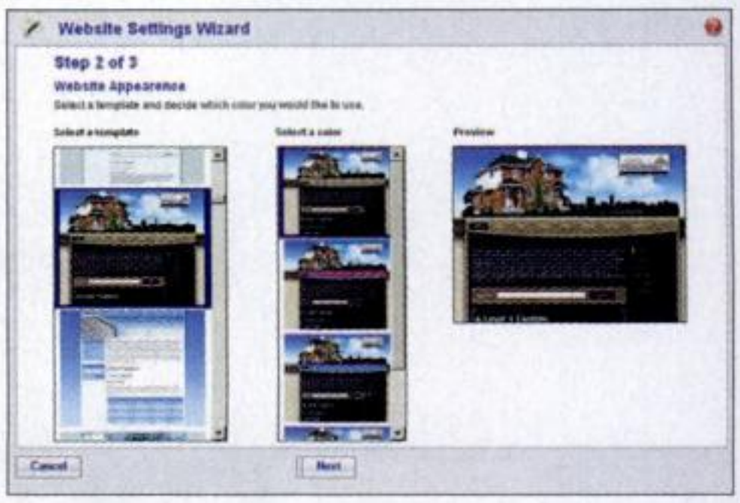

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DIVE INTO W

If you want the ultimate in cooling performance—and who doesn't?—water-cooling is the only way to go. This part-by-part buyers guide will ensure that your entry into water is a clean dive rather than a painful belly-flop

BY JOSH NOREM

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ATER COOLING

At first blush, water-cooling a PC seems about as wise as spending an afternoon in Mexico drinking the local water, eating road-side tacos, and then paragliding over a crowded beach. Of course, using water to cool your PC isn't that foolish. In fact, it's not foolish at all: Water-cooling is the best bang-for-your-buck technique to cool your PC components, despite its seemingly steep price tag (compared to air-cooling). When compared to air-cooling, water-cooling provides better performance with a lot less noise, and it usually allows for higher overclocking. Sure, there are risks—we won't lie and say there aren't. But if you're careful, diligent, and able to RTFM, there's little chance of destroying your beloved rig or experiencing what we call in the Lab a "gusher."

Despite the relatively low risk involved, a lot of people are reticent to take the plunge due to their lack of knowledge, and that's where we come in. We'll walk you through the ins-and-outs of water-cooling, and explain what every component does. We'll also offer installation and maintenance tips, and take you on a virtual tour of a typical cooling loop. And with that, it's time to don your water wings (goggles are optional) and dive in.

PUMP

There are two kinds of pumps used in water-cooling: submersible pumps, which go inside a reservoir and are submerged underwater, and the non-submerged variety. Submersible pumps are typically found in external, all-in-one kits that sit on top of your case. The majority of pumps used in DIY water-cooling are the stand-alone, non-submersible variety. The key stat for your pump is its flow rate, the amount of coolant it can move in an hour.

When pump shopping, keep your ultimate goal in mind. If you're just cooling a CPU, you can go with a low-to-medium flow pump in the neighborhood of 150 gallons per hour (gph). If you want to cool a GPU, chipset, and a hard drive or two, you'll need a higher-flow pump. We recommend 300gph pumps when you're cooling more than just the CPU.

This pump model—which is packaged under different names—is widely regarded as one of the best available, and is found in many kits.

RESERVOIR

A reservoir is not necessary in a water-cooling kit, but it's a good idea to have one. First, it allows air bubbles to escape easily. Second, a reservoir greatly increases the total water volume in a cooling kit, thereby increasing cooling performance. Third, having a reservoir makes it easier to fill the kit with water, because you can just pull it out from your rig to top off your loop. Kits without a reservoir require a fill port or T-line, which makes filling and bleeding air from the system more difficult.

The best reservoirs are made from acrylic or molded plastic, and have a separator to ensure that the water is constantly moving through the reservoir.

The reservoir holds extra water to increase your cooling power, and makes it easier to remove air bubbles from the liquid coolant.

CLAMPS

Almost every water-cooling kit requires hose clamps around the tubing on the inlet and outlet barbs of your cooling blocks, pump, radiator, and reservoir, to prevent leaks. Even though the tubing usually fits onto the barb very securely, clamps are insurance against a catastrophic leak.

There are two types of clamps: the plastic, ratcheting type (shown here), and the metal clamps used in plumbing that are available at Home Depot. The plastic variety should be more than sufficient, if you use them properly. Make sure you use some sort of clamp on every tube end, and cinch the plastic clamp (using your hands only) until it's tight enough to keep the tubing on securely.

Even if the tube fits tightly onto the barb, always use clamps. We found this out the hard way!

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TUBING

The diameter of the inlet and outlet ports on the water blocks, pump, and reservoir will determine the size of the tubing you use. The most common way to identify tubing size is by its internal diameter, also known as ID. As a rule of thumb, wider-ID tubing delivers a higher flow rate. The higher the flow rate, the more cooling power a kit can bring to bear. The industry has settled on fat, 1/2-inch tubing for high performance water-cooling. Most other kits use 3/8-inch tubing, and some lesser kits even use 1/4-inch tubing. We recommend 1/2-inch tubing for maximum flow.

The type of tubing varies as well, but not radically. Most tubes are made from either Tygon, silicone, or just generic vinyl. Tygon is very expensive but bends well and doesn't crimp easily. Silicone is very flexible, but not widely available. And thus, we come to the most common type of tubing: vinyl. It's cheap, works well, and is readily available.

No, it's not transparent pasta. Tygon tubing is very thick, yet easy to bend.

RADIATOR

The radiator transfers heat from your water-cooling circuit to the environment outside your case. It's where the heat from your water-cooled components radiates out of the system. Aluminum is the most popular material for radiators because it's light, inexpensive, and can be crafted into very complex shapes—much more easily than copper. Most radiators are designed to work with a single 12cm fan, for maximum cooling with minimum noise. The more surface area on your radiator, the more heat it will be able to pull from your coolant, so some extremely high-end kits employ larger radiators, or even multiple radiators. In our tests, we've found that a single 12cm radiator is sufficient to cool a high-end CPU and GPU.

Which radiator is best? Every high-end kit we've tested has included the exact same radiator: the Black Ice Xtreme. It features flat aluminum water channels among a dense array of louvered fins. It doesn't require a lot of airflow to keep it cool, which makes for quiet computing.

The Black Ice Xtreme is the de facto radiator used in almost every kit available.

WATER BLOCKS

A water block is a copper heatsink that's mounted to your CPU or GPU to absorb the heat generated by that component. There are a zillion water-block designs on the market, and each manufacturer claims that its design is the best, based on its own internal testing. We've tested almost every big-name water block on the market, and though we've definitely seen differences among them, the performance delta is usually slight. Even the worst blocks provide decent performance, but some are better than others.

The differentiation point in water blocks is the path that water takes through the block. Some water blocks use simple channels carved in an "S" pattern, which is a rather rudimentary—yet effective—design that's cheap to manufacture. Other water-block manufacturers are now advocating a more sophisticated design known as the "pin matrix." Once water enters one of these blocks, it's forced through a grid of vertical pins. This design offers more surface area than "S" pattern designs, and more surface area means better cooling performance.

Aside from the radiator and tubing size, the type of water block you use has the biggest impact on a water-cooling kit's performance. The most important trait to look for when purchasing a block is that its inlet/outlet barbs match the tubing diameter of your other hardware. Aside from that, you'll want a water block with a low pressure drop, which ensures the water keeps moving through the block quickly. The best blocks we've tested are the Danger Den TDX and Swiftech's Apogee, which both use a pin matrix design.

The Swiftech block keeps the water moving at a high rate of speed by squirting it down onto the middle of the block (right above where the CPU core is located) through a process called jet impingement. The water jet creates major turbulence where the water contacts the block, which helps transfer heat away from the block.

Water blocks come in a wide assortment of shapes, sizes, and designs.

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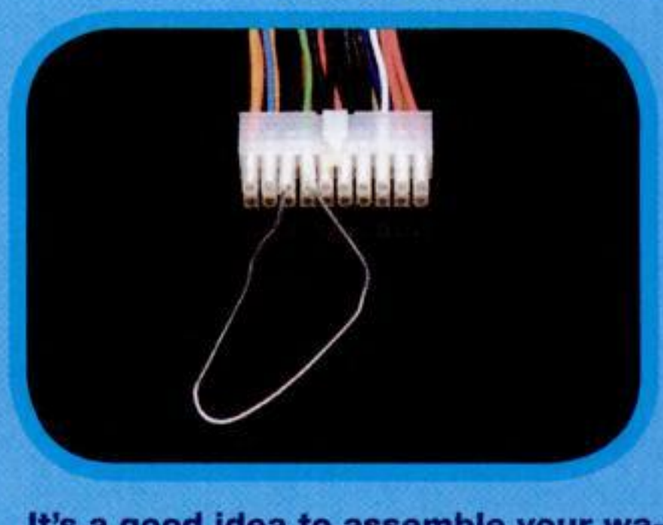
INSTALLATION TIPS

Installing a water-cooling kit can be very scary, especially if you don't have an experienced helper to be the wind beneath your water wings. Let us be that wind.

First, it's not a bad idea to do a dry run outside of your case to make sure none of the fittings are leaking (you'll need a PSU to do this, so you might want to do the dry run next to your PC). Place the block(s), radiator, pump, and reservoir in a circular pattern, and connect them with the provided tubing in the order dictated by the manual. Secure each fitting with a hose clamp, and then fill the reservoir until it's full. Next, lift and tilt the reservoir above the rest of the parts to fill the tubes with water.

When you have filled the reservoir with as much water as possible, prepare to send power to the pump. You do this by turning off and unplugging the PSU, and unplugging the large 20/24-pin ATX power connector from your mobo, and shorting pins number three and four on the row adjacent to the clip (the green and black pins shown), using a paper clip. Then connect a power cable to the pump, and plug in and turn on the PSU. Water should begin to circulate, which will empty the reservoir, so fill it as needed. Let the whole system run for a few hours. If there are no leaks, you're good to go. If there are leaks, investigate the affected area and fix the problem.

Once you are sure everything is working as it should, drain the kit and prepare to install it inside your case. Install the water blocks first, then the radiator, then the pump, and finally the reservoir. Each kit is a little different, so you should look in the manual for kit-specific instructions. Though it varies on a kit-by-kit basis, we recommend you run the pump outlet to the radiator inlet, the radiator outlet to the CPU block inlet, the CPU block outlet to any other block inlets. Then direct the water to your reservoir's inlet and close the loop by running a hose from the reservoir outlet to the pump's inlet. When the tubing is connected, fill the reservoir, then tilt your PC until you get water into the lowest points of the circuit. Connect the pump and hit the juice to push water through the circuit, and keep adding more coolant as necessary. Once your rig's full of water, remove the hot-wiring pin, plug the ATX connector back into your motherboard, and fire up your rig for real. When it's all working, you can give



It's a good idea to assemble your water-cooling kit outside your case and test it for leaks before installing it. To do this, attach the pump to your PSU, then short these pins to send power to the pump.

COOLANT

First things first: Do not, under any circumstances, use tap water! It contains hard minerals that will gunk up your radiator, pump, and reservoir. Instead, you should use distilled water, mixed with an additive to prevent corrosion and algae growth. You need this additive because the water block in a typical kit is made of copper, and the radiator is made of aluminum. These dissimilar metals create a pseudo battery upon contact with water, and will cause corrosion.

Swiftech's neon-green Hydrx coolant is a great additive, (it's also UV reactive) and costs just $3 online. Premixed, nonconductive coolants such as Fluid XP and MCT-5 from Danger Den are excellent as well, but they're significantly more expensive.

These additives will protect your water-cooling gear from corrosion, which can happen even if you use distilled water in your loop.

ROUTINE MAINTENANCE

Once your kit is up and running, you can forget about routine maintenance for the first year or so, as long as you use the correct ratio of distilled water to anti-corrosion additive. There's nothing to monitor on a day-to-day basis, but most manufacturers recommend you give your kit a thorough inspection every six to 12 months. That thorough inspection includes a basic checkup to ensure that the kit continues to run at its maximum level of performance.

The first thing to check is the water level in the reservoir. Because all water-cooling loops are closed circuits, evaporation shouldn't be a problem, but you will lose small amounts of your coolant over time. Checking the water level is as easy as eye-balling your reservoir. If it's not absolutely filled to the brim, top it off. In fact, if your reservoir is low you'll probably hear it before you see it, as the water will slosh around more and make annoying gurgling noises. External kits that sit on top of your case typically include a reservoir window, so you can check the fluid level at a glance.

Next, check the water blocks for signs of corrosion or blockage. This is very easy to do on a water block with an acrylic top, such as those from Danger Den, Koolance, and Asetek. On models with an opaque cover, your only option is to remove the water block and unscrew the cover, which can be time-consuming. However, as we said before, if you are using the correct ratio of distilled water to anti-corrosion additives (or the manufacturer-recommended bottle of coolant), there shouldn't be any corrosion or algae.

Finally, check the fans and radiator for dust and lint buildup. Blowing compressed air through the radiator and fan will exorcise its dust bunny demons quickly and easily.

Evaporation should be almost a non-issue, but it's still smart to keep an eye on your coolant level.

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Water-Cooling Walk-Through

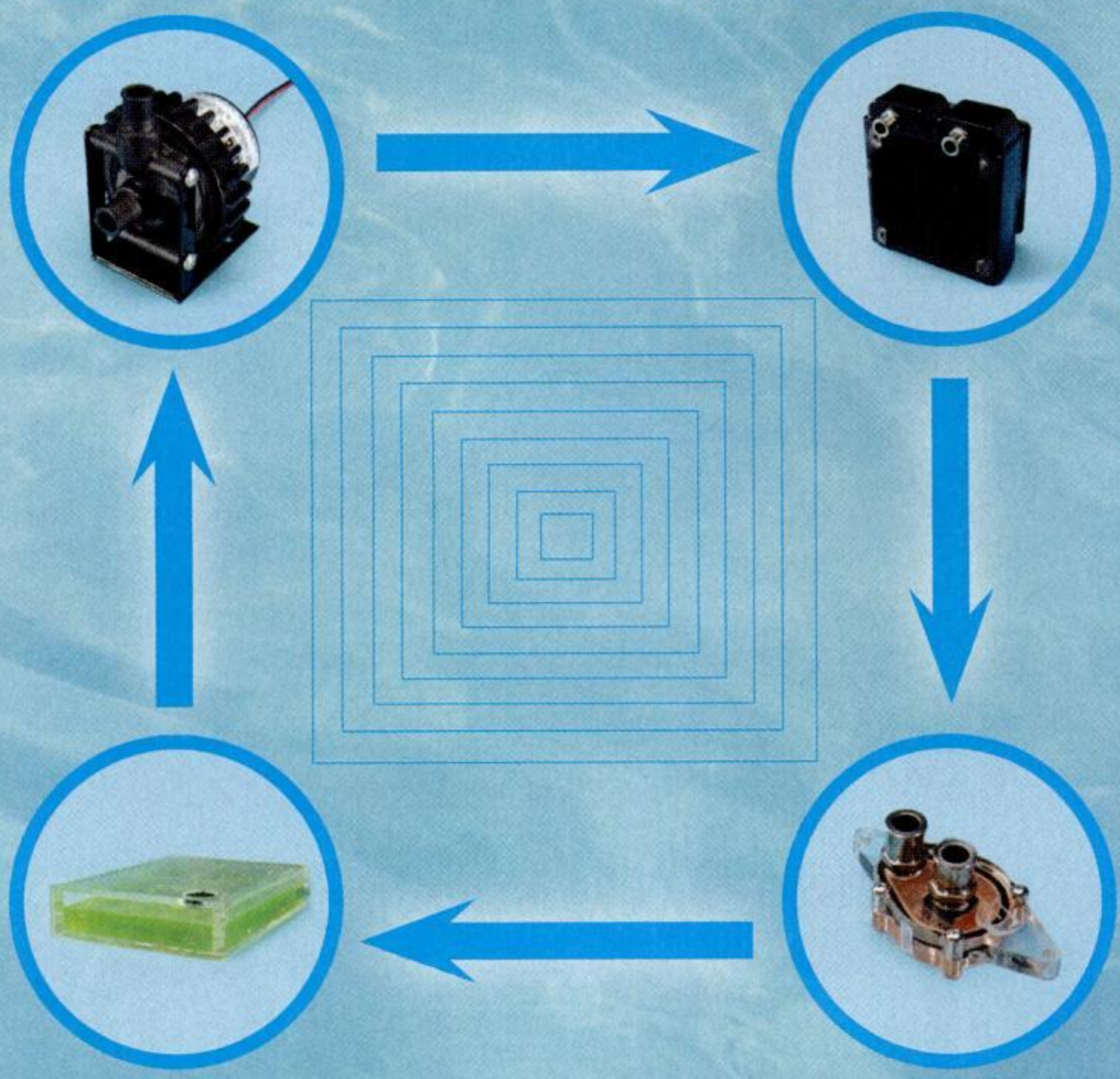
Join us for a step-by-step look at what happens in each stage of a water-cooling circuit

PUMP

The pump sucks the water into one end and shoots it out the other end. Inside the pump is an impeller, which is a small, rotating cylinder with blades that direct the water-flow. Pumps are rated by their head pressure, as well as their flow-rate, which is typically expressed in gallons per hour (gph). A pump's "lift" is how high it can push water vertically.

RADIATOR/FAN

Warm water enters the radiator and is squeezed into small aluminum columns that have fins soldered to them. The water transfers its heat to the columns and fins as it passes through, eventually exiting through the radiator outlet port. Usually, a fan is mounted to the radiator, to blow cool air over the fins, which transfers the heat from the fins to the air outside the case.



RESERVOIR

The reservoir is a large container of water, and is the only place in the circuit where air bubbles can easily escape the system. Water velocity inevitably drops when it enters the reservoir, because the water is no longer contained in a thin tube, so reservoirs are designed to suck the water through and push it out quickly in order to maintain a decent flow-rate.

WATER BLOCK(S)

Cold water escapes from the radiator and comes rushing into the water block's inlet port. The water block transfers heat from the CPU or GPU core to the water, which it then sends on its merry way. There are dozens of different water-block designs, but the basic rule is that the more surface area of block exposed to water, the more heat it will transfer.

DIY vs. Prefab Kit

Just as PC enthusiasts often wonder whether to build their own PC or go with a hassle-free prefab rig, the same dilemma exists in the water-cooling universe. And though we always recommend you build your own PC rather than buy one, things aren't so clear-cut when it comes to water-cooling.

A prefab kit is a pre-assembled collection of cooling parts sold by a manufacturer such as Swiftech or Koolance. When you buy a prefab kit, you are paying a small premium for the peace of mind that comes from knowing the kit will have everything you need to get up and running, as well as a thorough manual that walks you through the entire installation process. The DIY route, however, leaves you totally on your own to decide which blocks, pump, tubing, and other parts to buy. It takes some know-how to match the tubing size to the fittings on the blocks, to know if the pump's specs are appropriate, and most importantly, to know how to put it all together. A DIY kit includes instructions for each part, but no guided tour on how to assemble it.

So, which is better? In the early days of water-cooling, the kits were crap and DIY was the only way to get a kick-ass setup. That's no longer the case. Water-cooling has entered the mainstream, and stiff competition has led to powerful prefab kits from Swiftech, Danger Den, Corsair, and others that rival the best DIY packages available. While building a DIY kit can be a lot of fun, there's no shame in the prefab game, especially if you're anything less than a water-wizard. MPC

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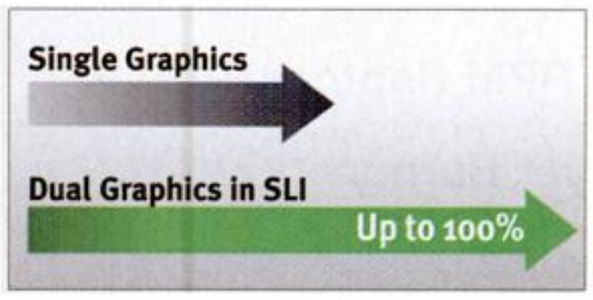


Until recently, SLI technology was solely available in desktop systems, due to space and thermal requirements. With enhanced engineering practices, Alienware was the first manufacturer to deliver both a 17" and 19" notebook utilizing SLI technology; delivering desktop-like graphics performance in a mobile form factor.

MARKET DEMAND

What's the driving force behind new NVIDIA SLI technology equipped notebooks? Power-hungry gaming aficionados.

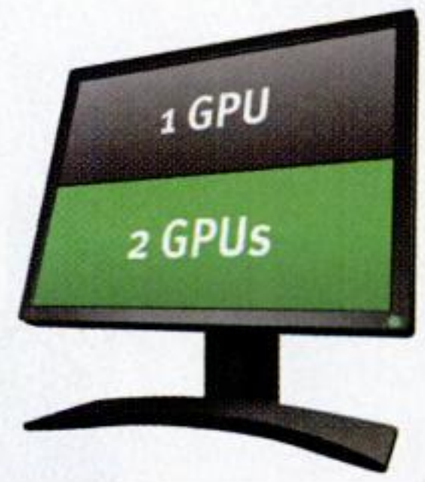
The increased demand for more advanced graphics processing is the result of power-users' demands to experience the best image quality possible while wreaking havoc in their game of choice. These powerful notebooks are regarded as desktop replacements, as they provide the power to compete directly against PCs while delivering portability.

As gamers push the limits of screen size, processing firepower and mobility, we're sure to see the capabilities of notebooks continue to follow suit. Bigger screens, faster processing, lighter materials.

CRUNCHING GRAPHICS

To satisfy the needs of gaming and media enthusiasts, it is becoming increasingly common to see notebook screen sizes of up to 19" with HD resolutions of up to 1920X1200. At these sizes, notebooks are rivaling the screen resolutions of their desktop counterparts, and require the processing punch that gamers-on-the-go need to compete at the highest level. This is the environment where SLI shines.

SLI is able to increase the speed of graphic processing by employing Split Frame Rendering (SFR), whereby it analyzes the rendered image and splits the workload 50/50 between the two Graphics Processing Units (GPUs). Both GPUs work on the same frame simultaneously, each performing roughly half of the render calculations.



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Add a Drive Bay Drawer to Your PC

With a little know-how and a few common tools and materials, you can add a drawer to the front of your case, and use it for storing PC-related odds and ends.

TIME 2:00 HOURS:MINUTES

Having a built-in drawer in your case's front bezel is pretty handy. It's a convenient place to keep excess screws, small tools, spare cables, and even a flashlight. We wanted our drawer to blend perfectly with our case, and to be big enough to hold a fair amount of hardware.

We also wanted to accomplish this project without the need for metalworking tools. That pretty much limited us to using a case that's equipped with drive rails, to act as the sliding mechanism for the drawer—installing drawer rails is more than a little beyond our cabinetry abilities.

After testing several different cases, we found that the ones with metal rails work best—plastic rails tend to snag when you slide them, making it more difficult to move the drawer in and out. It's also better to have a case with rails that actually protrude beyond the front bezel, such as the Aspire X-Navigator used here (**www.aspireusa.net**).

BY WILL **SMITH**

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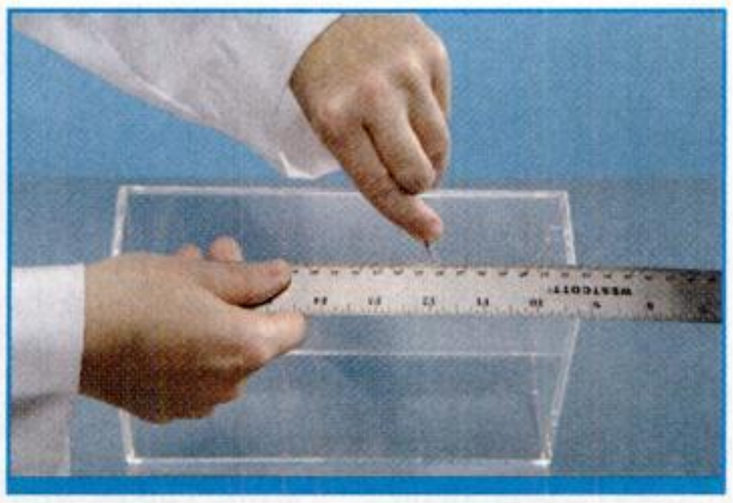
- **HACKSAW**
- **VARIABLE-SPEED JIGSAW**
- **DREMEL TOOL**
- **SAFETY GOGGLES**
- **RUBBER GLOVE**
- **ALL-PURPOSE ADHESIVE**
- **CLAMPS**
- **A DRIVE BAY-SIZE BOX**
  We used Container Store part no: 10025992, $15
- **ASSORTED HARDWARE**
- **CABINET HANDLE**
- **JOINING COMPOUND**

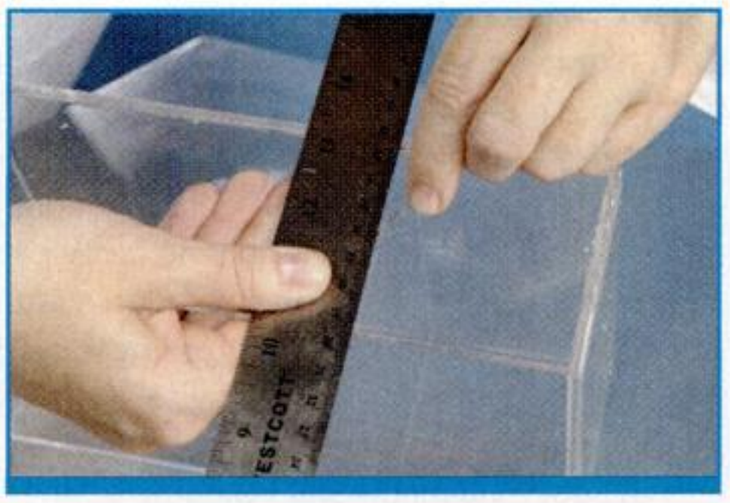
1 Measure and Mark

We found the box for our drawer at The Container Store (**http://tinyurl.com/llcbw**). It's nearly the perfect width, but it's too long to mount flush in the case. To fix that, we cut off one end using a jigsaw. To fit in a standard 5.25-inch bay, your drawer shouldn't be more than 15.5cm long, without the bezel mounted.

The old carpenter's rule applies here—measure twice, then cut. Mark 15.5cm on all three sides, as shown in the picture. We used a sharp Dremel bit to lightly scratch the marks into the plastic sides of the box. Once you've marked both edges of a side, you can use a straight edge and your marking implement to scratch the guideline you'll use when cutting off the end of the box.



It's important to mark the edges at exactly the same distance, otherwise it will be impossible to make a straight cut.



Use a straight edge to mark your cut line across the side of the box. You'll use this line to guide you when you cut off the end of the box.

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2 Cut the Box and Make Shims

After you've marked the three sides of the box that will be cut, it's time to don your safety goggles and fire up your jigsaw. Variable-speed jigsaws work best; you'll need to start slow in order to keep from melting the plastic, or creating jagged edges. We recommend using a multipurpose bit, suitable for metal or plastic. If you don't have a variable-speed jigsaw, any hacksaw will do the job—it will just take a few minutes longer.

Cut the sides of the box first, then cut the bottom of the box (as shown in the image). You'll want to support the edges, and be very careful not to move your fingers in the path of the blade. Be sure to stop your cut before you reach the edge, the lower portion of the blade shouldn't come in contact with the uncut sides of the box.

Once you've finished the main cut, you'll want to cut a couple of excess pieces of plastic to use as shims. Cut the shims to be about the same size as your case's drive rails. The box we're using is just a touch too narrow for a standard drive bay. We'll use the shims to fill the gap, and make a nice tight fit for the drawer.

Be very careful when you're cutting with a jigsaw. Cut on the slowest speed at which you see any progress, to avoid jagged, uneven edges on your drawer.

3 Mark the Rails and Glue the Shims

Next, you'll want to slide the drawer into the case, to see where you need to place the drive rails. Leave enough room at the top of the slot to slide the drawer out, and make sure that the bottom of the drawer clears the slot cover on the bezel below. With the drawer placed where you like it, scratch a mark that aligns with the top edge of the drive rail's slot in the case.

Remove the drawer from the case, and measure the distance from the top of the drawer to the mark you made. Make another mark further back along the drawer, and repeat the marks at the same height on the other wall of the drawer. You'll use these marks to align the shims and the drive rails when you mount them.

Next, you'll want to glue the shims to the outside of the drawer. Don your rubber gloves and apply a small amount of multi-purpose adhesive down the length of the shim. Using the marks you made, mount the shim on the drawer, and clamp it into place. Let it sit until the glue has cured—usually five minutes—then repeat on the other side of the drawer.

Slide the drawer into the case, and mark where the rail slots on the case meet the drawer.

If you first glue the shims to the drawer it will be easier to drill through them when mounting the drive rails.

4 Mount the Handle

It's a good idea to give the glued shims 10 or 15 minutes to cure before you start drilling, so we'll use the break to mount the handle on one of the case's bezels. Mounting the handle is pretty simple, but you need to measure carefully to make sure you don't end up with an off-center handle. You may also need to use the Dremel to shorten the screws that come with the handle. They're usually mounted through a few inches of wood, so they'll be much too long for our millimeters-thick case bezel.

Mount the screws in a vise (if you don't have a vise, you can use a pair of pliers), put a cutting blade on the Dremel, and cut all but a half-inch or so off both screws. Then, using a Dremel bit that's slightly larger than the screws that came with the handle, drill two holes for the handle in the center of the bezel. Mount the handle on the two holes—it's a good idea to use a large washer on each screw, so that you don't accidentally rip the handle off of the bezel.

While you're waiting on the glue from the previous step to cure, you can mount the handle on one of your case's bezels. First you'll drill a couple of holes through the bezel.

Then you'll screw the handle onto the bezel. Be careful not to over-tighten, or you'll warp or crack the bezel.

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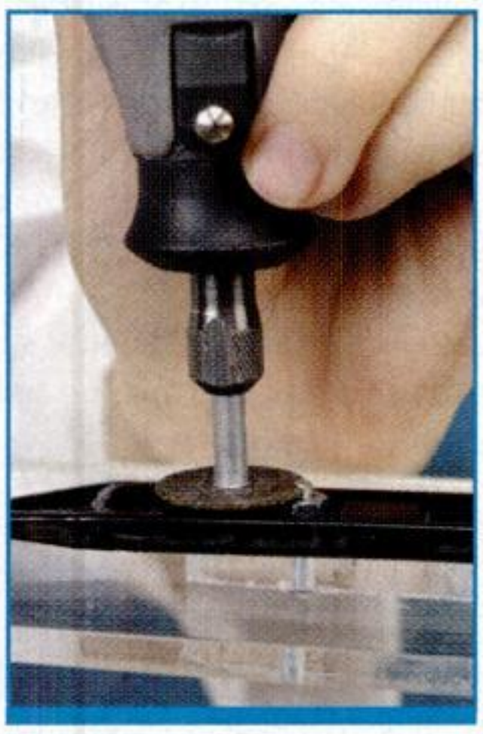
5 Mount the Drive Rails

Before you can mount the rails, you'll need to drill a hole through the rail, and the side of the drawer.



Now it's time to measure and drill the holes you'll use to mount your drive rails onto the case. Make sure you use a drill bit that's appropriate for your rail material—a metal bit for metal rails and a multipurpose bit for plastic rails. It's crucial that you make sure the rails are perfectly level, or your drawer will hang when you slide it in and out of the case. We recommend using two holes per rail to secure the rails in place.

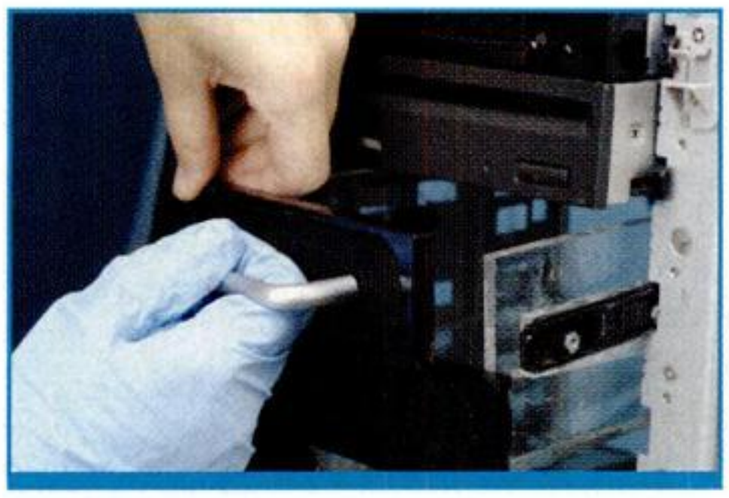
Once you've drilled the holes, you can use your screws, nuts, and washers to mount the rails. You'll need to use the Dremel tool to cut down the screws so the drawer will slide in and out of the case. Be sure to wear eye protection when you use the Dremel!

After the rails are mounted, slide the drawer into your case. You might need to either trim or bend metal protrusions in the slots if they block the drawer. You might also need to make small adjustments to the alignment of the rails, if the drawer's movement isn't smooth. Once you're happy with the movement of the drawer, move on to the next step.

Once you've bolted the rails to the drawer, you'll need to cut any protrusions off with the Dremel, or your drawer won't open and close.

6 Glue the Bezels

The last step is to trim any protuberances from the slot covers you're going to use, so they'll slide in and out of the case easily. Then, slide the drawer back into the case, and apply glue to the front edge of the drawer. Make sure the glue you're using is designed to join the materials your drawer and bezel are made of. Place the bezels on the glued edges, and apply pressure until the glue sets. You'll probably want to do one bezel at a time. After five minutes, the glue will be set, but we recommend letting it set for 24 hours before you put pressure on the seal. MPC



Finally, you'll need to glue the bezels onto the drawer. To ensure proper alignment, it's best to mount the drawer in the case, before you glue on the bezels.

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Ask the Doctor

CALL OF THE BLUE SCREEN

*My PC crashes with a fatal blue screen after playing **Call of Duty 2** for 15 to 20 minutes; the screen doesn't stay up long enough for me to read what it says. I'm running a Gigabyte GA-K8N51GMF-9 mobo with an AMD Athlon 64 3200+ CPU, 1GB of RAM, and an EVGA GeForce 6800 GS videocard. I took the rig to my local geek shop, and they recommended I get a more powerful power supply. I upgraded to a 620-watt model, but it didn't solve the problem. Gigabyte's and EVGA's tech support people have both said the problem is a hardware conflict, but neither has a real solution for me. Can you help?*

—Patrick Patton

The problem you describe typically results from excessively aggressive overclocking. If you're overclocking the videocard, stop; if you're overclocking the CPU, stop. The power supply is another of the usual suspects; but because you've already upgraded, it's probably not the source of your trouble unless you bought one of very low quality. You should also review the thermal conditions inside your case. Open the case and point a room fan at it. If the system stops crashing, you've found the culprit. You might need a more powerful heatsink on your CPU, new thermal grease, or additional fans to bring down your components' temps. If that still doesn't fix the problem, test your memory using *memtest86+*, which you can download from www.memtest.org.

CATCH-22: THE MUSICAL

DRM issues with legally downloaded "Plays4Sure" music are tempting me to cross over to the dark side. Many of the songs I've purchased will no longer play because their DRM licenses have become corrupted. I also have DRM-protected tracks on my MP3 player that will play on that device, but won't transfer to my computer. As I understand it, the end user is solely responsible for safeguarding downloaded music, but it seems that the end user has very little power to actually do this. This quote is from Microsoft's support website: "The license issuer, such as the online store where you bought the protected file, determines whether you are permitted to back up a specific license. Therefore, you may not be able to back up all your licenses. If you cannot back up the license for a particular file, you cannot restore that license.... If you cannot restore a license, you cannot play the protected file." Does this mean I'm screwed when it comes to the music I've paid for?

—Matthew Thornton

We understand the need to protect property rights, but today's half-assed DRM schemes seem destined to screw consumers. Our advice: Rent—but don't buy—DRM-protected music.

In a word, yes. If your licenses have already been corrupted, and you don't have a backup copy, or your service provider doesn't allow you to make one, there's not much you can do about it. The record industry endorses DRM because it's convinced the technology protects their property rights. In reality, this form of protection—which tramples all over consumers' fair-use rights—can be easily defeated by digitally recording the music in real time. The Doctor's prescription? Buy the music you really care about in the form of unencrypted CDs, so you can back it up, port it to other devices, and sell or trade it if you ever do grow tired of it (do the right thing and delete any ripped copies, first). If you don't have the budget to amass a huge library of music as rapidly as you'd like, check out one of the online music "rental" services, such as Rhapsody. Several have subscription models that allow you to transfer music to a portable player. If *those* licenses get corrupted, you need only download the music again at no additional expense other than your subscription fee.

MICROSOFT BROKE MY TOOL

*I'd been using Microsoft's **System File Checker** to resolve problems with two PCs that have Windows XP Media Center Edition installed on them. But after I installed Service Pack 2, **SFC's** scans are interrupted by a message instructing me to install the SP2 CD—which doesn't exist because I installed SP2 over the Internet. I ordered the SP2 disc from Microsoft, but now I get an error message that I've inserted the wrong CD.*

—Rudy Nichols

The problem is that *System File Checker* must verify the SP2 files against the originally installed files, but the program doesn't recognize either of the Windows discs you have. There are two solutions: You can either create a new Windows install disc with SP2 slipstreamed into it, or you can edit the registry to point to the SP2 setup files. To do the latter, run Regedit (click the Start menu, choose Run, and type regedit in the window) and modify the following entry: `Microsoft\Windows\CurrentVersion\Setup`. In the right-hand pane, right-click ServicePackSourcePath, click Modify, type `%windir%\ServicePackFiles`, and click OK. Reboot when you're finished. MPC

SECOND OPINION

I recently encountered a problem very similar to one Carlos Conrique described in your June column ("Ghost Drive"). After returning two Western Digital SATA drives in a row that my Asus K8V SE motherboard refused to recognize, I bought a Maxtor unit—which my motherboard also refused to recognize. While reading Maxtor's instruction manual, I discovered the source of my problem. Although both the Western Digital and the Maxtor SATA drives are considered "jumperless," they both have jumpers to set their interface speed to either 150MB/s or 300MB/s. The default setting for both drives is jumper-off, to set the interface speed to 300MB/s—a speed that the Via chipset on my Asus motherboard does not support. As soon as I installed the jumper, the drive worked fine. Because Carlos' Abit VT7 motherboard also uses a Via chipset, I bet this solution would work for him, too.

—Ed Acheson

Just as some medical doctors are obsessed with curing diseases, Maximum PC's Doctor is a certified fanatic when it comes to resolving readers' thorniest computer problems. Send your questions—and your obsessions—to doctor@maximumpc.com.

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interoperability problems not only with the older 802.11b and 802.11g hardware, but also between different brands using the same chipset. The latest batch of hardware just pushed the envelope a little harder—emphasizing the incompatibilities in the process.

But now that the groups involved in phrasing the first 802.11n draft have learned they can't simply push through a standard based on the existing hardware they have for sale, the remediation process begins. And as exciting as the prospect might be, the process is actually quite boring.

The IEEE meets every two months, and a new draft standard can be submitted at each meeting. The organization approved Draft 1.0 in May, so it's conceivable that they could be considering Draft 3.0 at their September gathering. Each time a draft is proposed, a call for comments goes out. The draft is then revised in response to these comments and it moves a step closer to ratification.

Manufacturers don't necessarily have to wait for final ratification before building their hardware. Equipment that could be certified as 802.11g-compliant reached the market when that standard was at draft 5.10. The tipping point arrives when the bulk of the hardware issues are resolved. If there's consensus that any outstanding issues are inconsequential, the hardware can be baked. What remains at that point is simple firmware, and that's fungible up to the moment the box is shrink-wrapped.

ARE WE THERE YET?

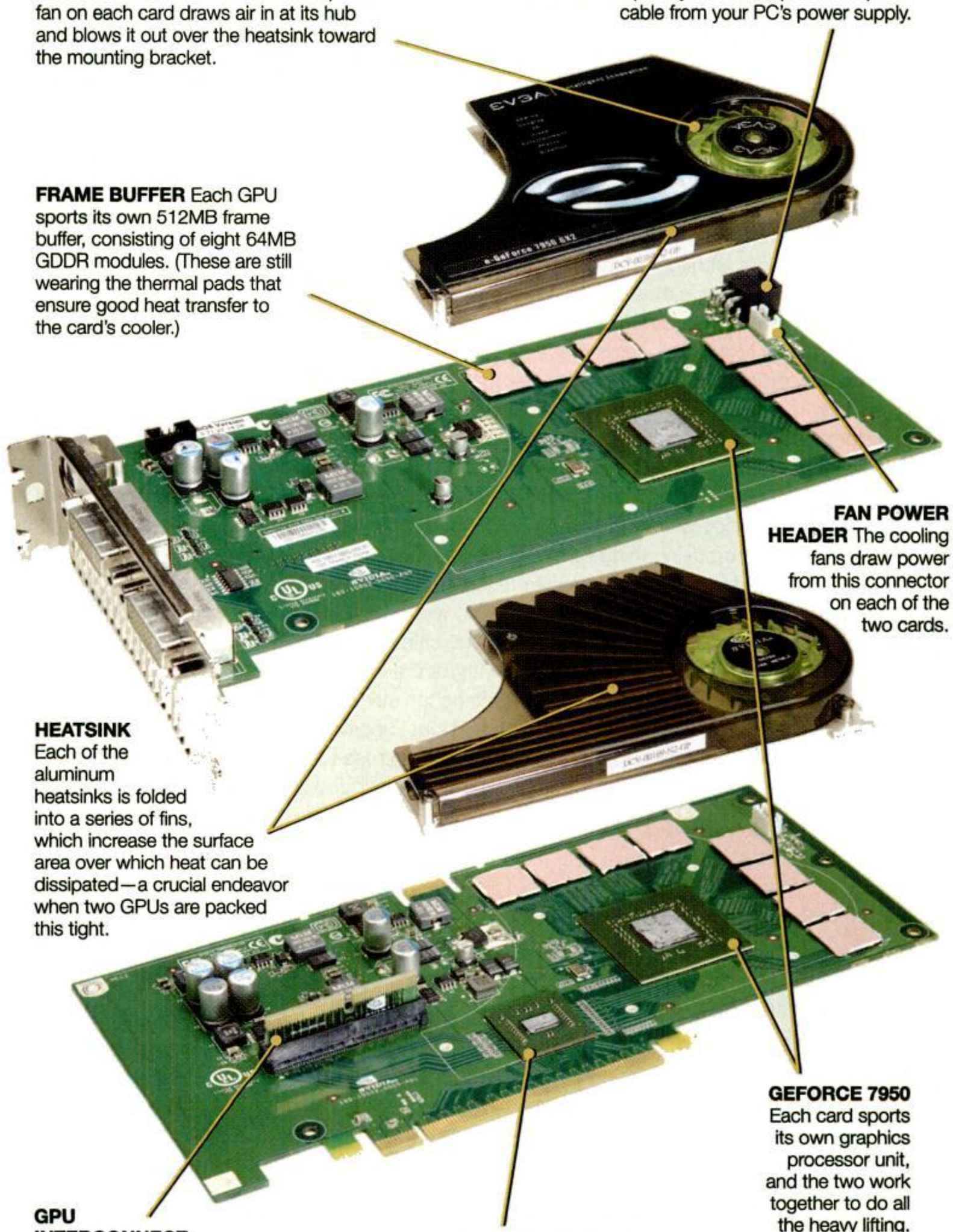
Unfortunately, none of this really provides any insight as to when we can finally expect true 802.11n products to hit the market. The 12,000 shocks to the system, however, seem to have delivered a dose of reality to the opposing camps. At this point, their differences of opinion are more akin to how stiff a car's springs should be as opposed to arguing whether or not a car should have springs at all.

Final IEEE ratification could occur in September or November, and the Wi-Fi Alliance can be expected to give its nod of approval shortly thereafter. If these events fall into line, we could see genuine 802.11n products by the holidays—or before the end of Q1 2007 at the latest. Considering how long we've already waited (and if you haven't told at least one "Waiting for 802.11n" joke in the interim, you're not half the Alpha Geek you think you are), that time is right around the corner.

The result will be Wi-Fi products that deliver real-world throughput upwards of 80Mb/s while functioning alongside and interacting with older equipment. And won't that be worth the wait? MPC

Dual-GPU Videocard

The only thing more fun than benchmarking expensive hardware is taking it apart. We were particularly curious to see what makes nVidia's GeForce 7950 GX2 tick, so we sacrificed this EVGA board to the autopsy knife.



PCI-E POWER CONNECTOR Unlike a conventional dual-card configuration, the 7950 GX2 card requires just one six-pin PCI Express cable from your PC's power supply.

COOLING FAN A 40mm variable-speed fan on each card draws air in at its hub and blows it out over the heatsink toward the mounting bracket.

FRAME BUFFER Each GPU sports its own 512MB frame buffer, consisting of eight 64MB GDDR modules. (These are still wearing the thermal pads that ensure good heat transfer to the card's cooler.)

FAN POWER HEADER The cooling fans draw power from this connector on each of the two cards.

HEATSINK Each of the aluminum heatsinks is folded into a series of fins, which increase the surface area over which heat can be dissipated—a crucial endeavor when two GPUs are packed this tight.

GEFORCE 7950 Each card sports its own graphics processor unit, and the two work together to do all the heavy lifting.

GPU INTERCONNECT This tiny printed circuit board passes data back and forth between the two larger printed circuit boards.

NVIDIA PCI EXPRESS SWITCH This proprietary chip directs traffic between the dual GPUs and frame buffers and the PCI Express bus.

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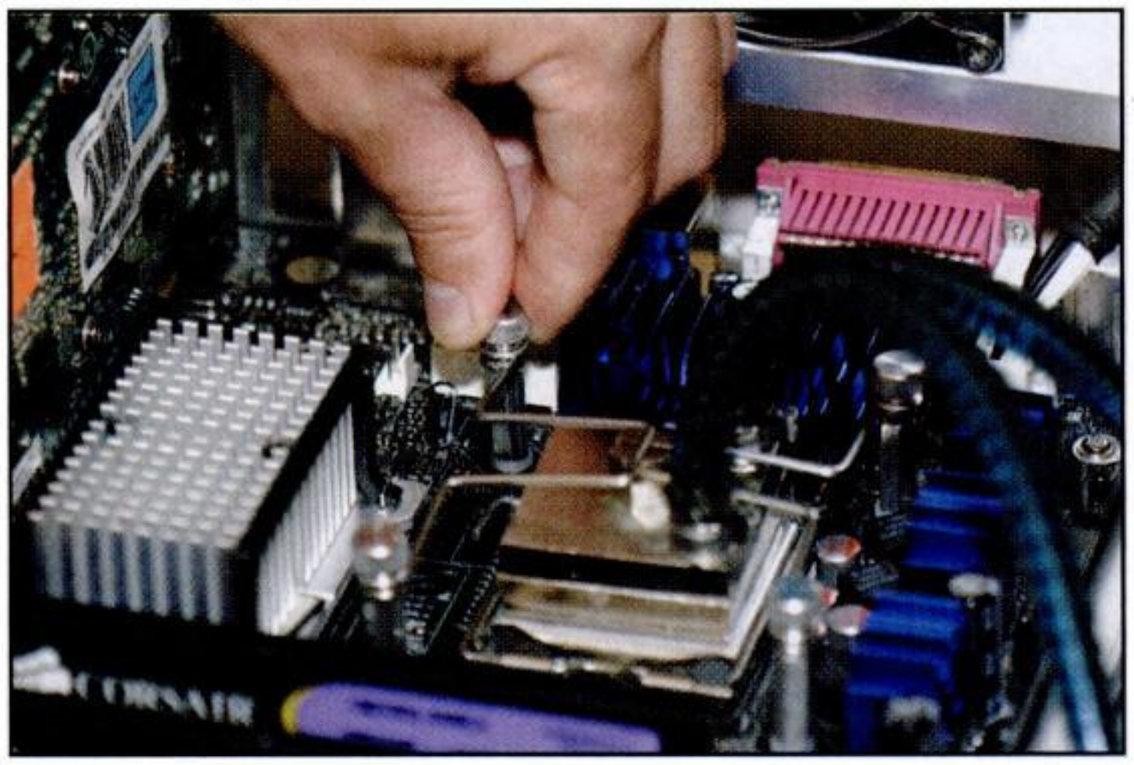
JOSH **NOREM**

Asks How to Best Cool Conroe?

Intel's new Core 2 Extreme CPU runs cool and quiet, but how cool? To find out, I tested it with every high-end cooler in the Lab



Unfortunately, Intel is sticking with LGA775's silly retention mechanism, which requires motherboard removal to install nine out of 10 aftermarket coolers.

Intel's previous-gen Prescott processors ran so hot, the company was forced to chuck the design and start over. The new design, named Core 2 (code-named Conroe), is a low-watt processor, similar to the cool-running Pentium M CPU that inspired the design. As the resident cooling aficionado, I couldn't wait to see just how cool the new Core architecture runs, as it's rated at a mere 65W TDP (thermal design power, a measure of how much heat it generates). For comparison, most dual-core Presler CPUs have a TDP rating between 95W and 130W. Most videocards these days are 110W.

The new procs undoubtedly run cooler than previous Intel offerings—they're on par with Athlon 64s. We wanted to find out how Core 2 performs using the stock Intel cooler and several top-of-the-line air-and-water coolers. Though Core 2's temperatures are excellent, the truth is that with the stock cooler, the CPU runs a smidge hotter than we usually experience with high-end AMD CPUs.

But the most surprising thing I discovered was that Core 2—unlike any other high-end processor we've ever tested—maintains relatively low temperatures *without* active cooling. In fact, we were able to run both the standard E6700 and the extreme X6800 chips for hours with the CPU fan disconnected, and apparently without the CPU throttling down at all—truly an amazing feat and something I'm still examining.

The first test involved the Zalman 9500, and I just unplugged the fan and watched the temperatures rise. The CPU temp rose to 75 C and wouldn't rise any higher, under full load. I even transcoded an entire DVD to Divx without the CPU fan spinning. I also tested with the Apex Ultra kit, a Scythe Mine, and the Freezone, to see which would do the best with Conroe. The benchmarks speak for themselves—the TEC and water-based Freezone spanked the competition, with the Swiftech Apex Ultra running a distant second.

In the final tally, Conroe seems to have achieved something that's been possible with AMD systems for some time now—the ability to run cool and quiet without giving up any performance. Folks who've shied away from Intel procs because of heat concerns no longer have anything to worry about.

BENCHMARKS

	STOCK COOLER	SCYTHE MINE	ZALMAN 9500 LED	COOLIT FREEZONE	SWIFTECH APEX ULTRA
IDLE (C)	44	39	37	**23**	34
100% LOAD (C)	58	54	49	**37**	45

Best scores are bolded. All temperatures were measured via the onboard sensors, using the utilities provided by the motherboard manufacturer. Idle temperatures were measured after 30 minutes of inactivity and full-load temps were achieved running CPU Burn-in for one hour.

Gordon Mah Ung

Ponders the 2TB Limit

Dream Machine takes a capacity step backward—we tell you why

You normally don't get the scoop on the hardware that doesn't make the Dream Machine cut, but I've decided to spill the beans on this one.

We started out with no fewer than six 750GB Seagate Barracuda 7200.10 drives—a whopping 4.5TB of storage space—which we originally planned to configure six drives in one massive (but impractical RAID 0) partition. Unfortunately, no matter what we tried, the large array wouldn't work. The culprit was nVidia's new nForce 590 SLI chipset, which I praised so lovingly last month. While the onboard RAID lets you do such nifty tricks as set up two arrays on a single controller, there's a hard capacity limit of 2TB. We tried multiple RAID configurations across all six SATA ports and even tried running JBOD, with no joy.

The problem? nVidia currently only supports 32-bit LBA, not 64-bit. That support won't appear until later this year. Drat. Even if we could have created the partition, we likely would have run into problems with Windows XP, which is limited to a 2.2TB partitions. D'oh.

When will the fix come? Officials at nVidia told us they didn't see the need for 64-bit LBA at the rollout of 590, but now have it on the roadmap as a driver update later this year. What about Microsoft? We haven't gotten the straight story on Vista's support for 64-bit LBA, but we sure hope it's there because power users are rapidly approaching the point where they'll need 2TB-plus support. With Seagate's incredible Barracudas offering 750GB per drive, 1TB drives can't be that far off.

Let's hope that all the controller manufacturers bang their heads together on this one, because when I'm trying to build a three-drive 4TB array next summer, that sucker better work.

Our dreams of using six 750GB Seagate drives for one 4.5TB partition were dashed by the nVidia chipset's limitations.

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How We Test

Real-world benchmarks. Real-world results

Computer performance used to be measured with synthetic tests that had little or no bearing on real-world performance. Even worse, when hardware vendors started tailoring their drivers for these synthetic tests, the performance in actual games and applications sometimes dropped.

At *Maximum PC*, our mantra for testing has always been "real world." We use tests that reflect tasks power users perform every single day. With that in mind, here are the six benchmarks we use to test every system we review.

SYSmark2004 SE: This is an update of the *SYSmark2004* benchmark, which uses a suite of such common applications as Microsoft *Word*, *Excel*, *PowerPoint*, Macromedia *Dreamweaver*, *Flash*, and *Winzip* to test general performance. It isn't heavy in multithreading, but it does feature multitasking tests.

Adobe Premiere Pro 2.0: We finally ditched our old standard-def *Premiere* test for one that uses high-def source material. The test is multithreaded, uses the GPU for transitions, and is brutal. It takes about an hour on our zero-point to render a short two minute, 46 second benchmark movie in the program.

Adobe Photoshop CS2: We start with a RAW photo shot with a Canon EOS 20D, and apply a crapload of filters and other tasks from *CS2* to see just how fast a rig can chew through the workload. Because we use every filter we can, the test is more fair and balanced than the usual cherry picking of *Photoshop* tests.

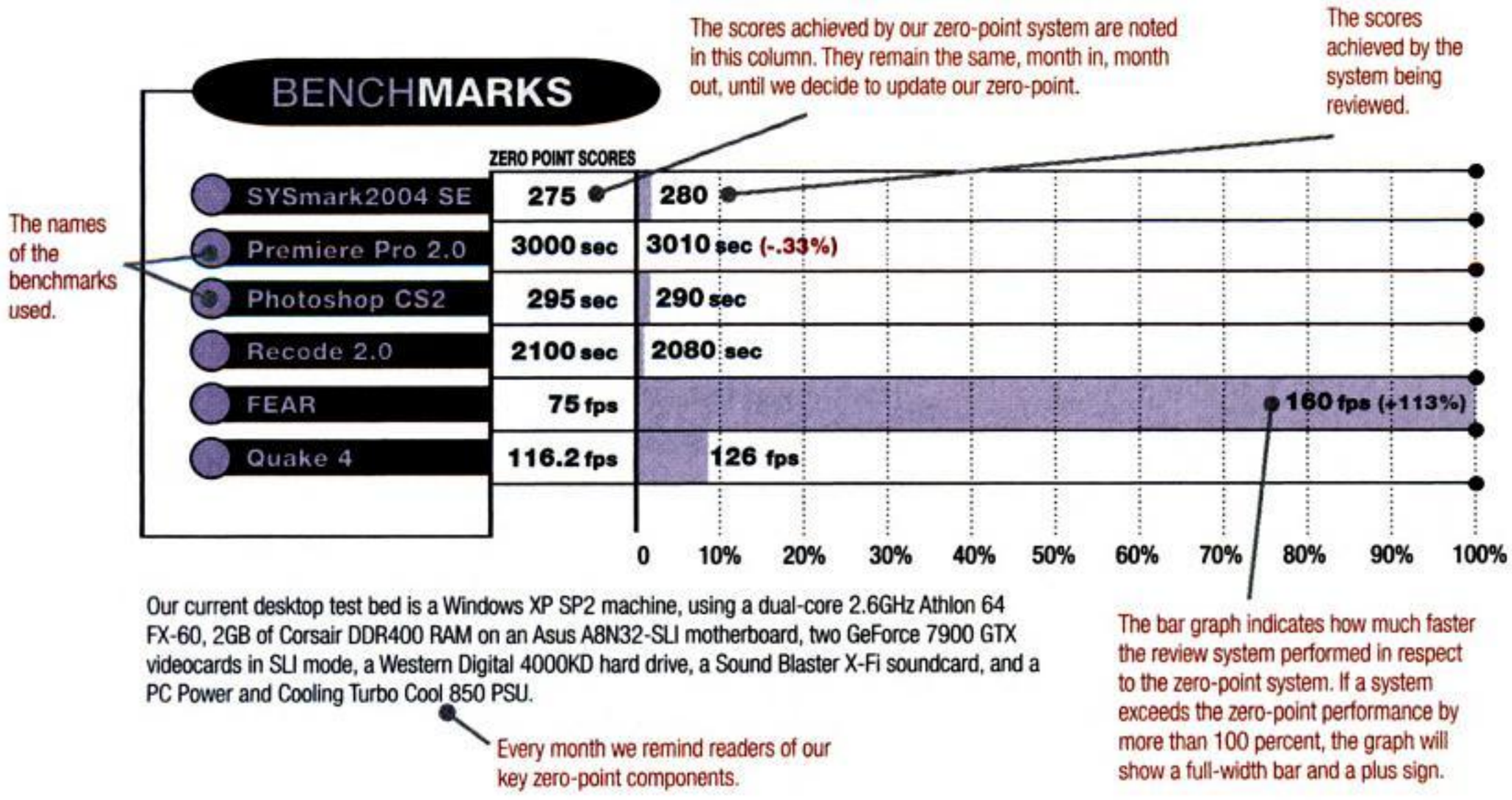
Ahead Nero Recode 2.0: *Nero Recode 2.0* is one of the fastest video-transcoding utilities. We copy unencrypted VOB files to the hard drive, then convert the movie to the Sony PSP's MPEG-4-based format. The program is heavily multithreaded, and shows marked performance increases on dual-core machines.

Quake 4: Based on the *Doom 3* engine, *Quake 4* is a popular OpenGL game. We run our test at 1600x1200 with 4x antialiasing and 4x anisotropic filtering. Generally, more robust OpenGL drivers yield better performance. We use a custom timedemo recorded using the 1.2 patch, which supports Hyper-Threading and dual-core processors.

FEAR: Monolith's *FEAR* is a cutting-edge DirectX game that pushes graphics hardware and systems to the limit. We run *FEAR* at 1600x1200 with soft shadows, physics, and audio acceleration enabled, and using the 1.03 patch.

How to Read Our Benchmark Chart

Maximum PC's test beds double as zero-point systems, against which all review systems are compared. Here's how to read our benchmark chart.


BENCHMARKS
The scores achieved by our zero-point system are noted in this column. They remain the same, month in, month out, until we decide to update our zero-point.
The scores achieved by the system being reviewed.
ZERO POINT SCORES
SYSmark2004 SE
275
280
Premiere Pro 2.0
3000 sec
3010 sec (-.33%)
Photoshop CS2
295 sec
290 sec
Recode 2.0
2100 sec
2080 sec
FEAR
75 fps
160 fps (+113%)
Quake 4
116.2 fps
126 fps
0
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
The names of the benchmarks used.
Our current desktop test bed is a Windows XP SP2 machine, using a dual-core 2.6GHz Athlon 64 FX-60, 2GB of Corsair DDR400 RAM on an Asus A8N32-SLI motherboard, two GeForce 7900 GTX videocards in SLI mode, a Western Digital 4000KD hard drive, a Sound Blaster X-Fi soundcard, and a PC Power and Cooling Turbo Cool 850 PSU.
Every month we remind readers of our key zero-point components.
The bar graph indicates how much faster the review system performed in respect to the zero-point system. If a system exceeds the zero-point performance by more than 100 percent, the graph will show a full-width bar and a plus sign.

BEST OF THE BEST

Our monthly category-by-category list of our favorite products. New products are in red.

High-end videocard, dual-card config
XFX GeForce 7900 GTX (model PV-T71F-YDD9)

High-end videocard, single-card config
eVGA e-GeForce 7950 GX2

Midrange videocard:
Sapphire Radeon X1900GT

Soundcard:
Creative Labs X-Fi Xtreme Music

Hard drive:
Seagate Barracuda 750GB 7200.10

External backup drive:
Western Digital Dual-Option Media Center 320GB

Portable USB drive:
Seagate Portable External 100GB

DVD burner:
Plextor PX-716A

Widescreen LCD monitor:
Dell 2407FPW
The 2407FPW includes all the goodness of the older Dell 2405FPW it replaces and gives you an inch more screen for less money!

Desktop LCD monitor:
NEC 90GX2

Socket AM2 Athlon 64 mobo:
Asus M2N32-SLI Deluxe Wireless Edition
The board isn't perfect, but its passive—and noiseless—cooling gives it the leg up over the competition for folks who want to build AM2

Socket 775 Core 2 Duo mobo:
We don't have a recommendation yet, but you shouldn't buy an Intel mobo without Core 2 Duo compatibility

Portable MP3 player:
Apple iPod

5.1 speakers:
M-Audio Studiophile LX4 5.1 (LX4 2.1 with 5.1 Expander System)

2.1 speakers:
M-Audio Studiophile LX4 2.1

Mid-tower case:
ThermalTake Armor Jr.

Full-tower case:
Silverstone TJ07

Games we are playing: Battlefield 2: Armored Fury, Hitman: Blood Money, Titan's Quest, Tom Clancy's Ghost Recon: Advanced Warfighter

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BFG GeForce 7950 GX2

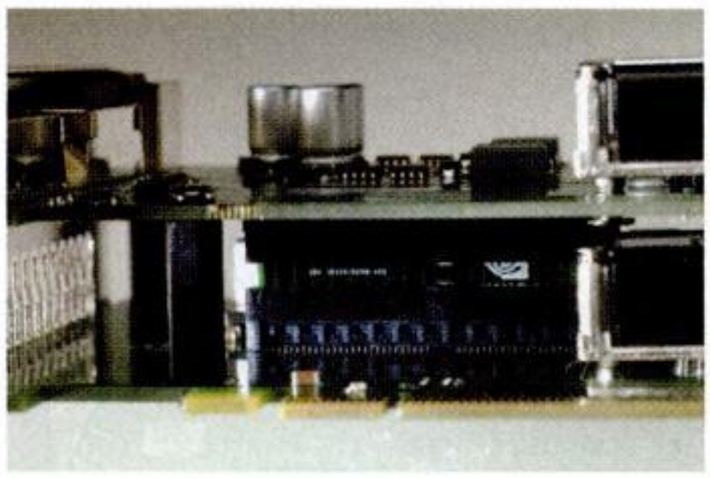
Does SLI by any other name smell as sweet?

nVidia technology enables BFG's GeForce 7950 GX2 to deliver the power of two fast videocards while requiring just one PCI Express slot.

Thanks to the GeForce 7950 GX2 at the heart of BFG's latest offering, you can now build a dual-GeForce rig using any PCI Express-compliant motherboard—including CrossFire and Intel models.

As much as the 7950 GX2 sounds like SLI in a single slot, nVidia pointedly does not describe it as such. The company is also not allowing the do-it-yourself crowd to use two GX2s to build their own quad-SLI systems. And that's fine with us: The current crop of 30-inch panels that would render quad SLI worthwhile aren't fast enough for gaming anyway.

Architecturally, the 7950 GX2 resembles the 7900 GTX: It's outfitted with 24 pixel-shader units and eight vertex-shader units, and is paired with 512MB of GDDR3 memory. In order to maintain reasonable thermals, however, the core is clocked at just 500MHz and the memory runs at 600MHz. Factory-overclocked models were coming onto the market as we went to press, but this BFG card was clocked the same as nVidia's reference design. Specs like those would have been big news six months ago, but they've become commonplace lately. What's not so common is the fact that every 7950 GX2 card has two of these puppies.



The dual 7950 GX2s in nVidia's videocard sandwich communicate via this tiny card connecting the two circuit boards.

A GX2 card is formed by bolting together two PCBs, but only one has a PCI Express edge connector. A proprietary PCI Express switch on the second PCB handles communication between the two processors and interactions with the host PC's PCI Express bus. Although each board has its own cooling fan, the GX2 is whisper-quiet. There's a pair of Dual-Link DVI connectors, but as with conventional SLI, output to the second DVI connector is shut down while running in dual-GPU mode. There is S- and component-video output, but no video input.

DRM COMES TO VIDEOCARDS

The 7950 GX2 is one of the first videocards to feature the HDCP technology required to play copy-protected Blu-ray and HD-DVD movies. HDCP requires each component in the digital playback chain—the disc drive, the videocard, and the display—to be outfitted with a crypto-ROM that stores a set of encryption keys. These encryption keys are also stored on each copy-protected Blu-ray and HD-DVD disc.

Keys are exchanged at each stage of digital playback: from the disc to the drive, from the drive to the videocard, and from the videocard to the display. If at any point in the path this handshake fails to take place, the sending device can refuse to pass on high-definition data in digital form.

One obvious problem with this DRM scheme is that the vast majority of digital displays in use today are not HDCP capable, which will force users to revert to analog video connections (VGA or component) in order to enjoy high-definition video. But there's an aspect of AACS that's capable of blocking that avenue, too: It's called the Image Constraint Token (ICT). Discs encoded using ICT will restrict video output to a maximum resolution of 960x540 the moment the HDCP chain is broken. There are rumors that the ICT won't be enabled by Hollywood studios until after 2010, but no official word has come down.

What's even more troubling about HDCP, however, is the fact that if any device in the playback chain—or even an entire model line—is ever determined to have been compromised, meaning its copy-protection has been hacked or otherwise defeated, it can be placed on a blacklist that gets written to newly manufactured copy-protected discs. These discs will then refuse to send high-definition digital data to any device in that blacklisted family.

SO HOW FAST IS IT?

The benchmark chart shows that the 7950 GX2 easily lives up to nVidia's claim that its the fastest single videocard on the market.

SPECS

GPU	nVidia 7950 GX2 (x 2)
MEMORY	1GB GDDR3 (512MB x 2)
CORE CLOCK SPEED	500MHZ
MEMORY CLOCK SPEED	600MHz

BENCHMARKS

	7950 GX2	7900 GT / SLI	7900 GTX / SLI	X1900 XTX/ CROSSFIRE
3DMARK 06 GAME 1	19.4	12.5 / 22.7	15.0 / 27.2	18.4/ 32.0
3DMARK 06 GAME 2	27.3	17.6 / 33.1	20.7 / 38.1	20.0 / 35.2
FEAR	57.0	34.0 / 63.0	42.0 / 70.0	27.0 / 39.0
OBLIVION	22.9	16.1 / 15.9	19.5 / 20.2	21.2 / 21.2
QUAKE 4	89.2	49.2 / 83.6	66.7 / 113.8	58.0 / 92.7
HQV	88	88 / 88	88 / 88	63 / 0

Scores other than HQV represent frames per second at the native resolution of a 23-inch Viewsonic VP2330wb display: 1920x1200. Each card was installed in an Asus A8N32-SLI Deluxe motherboard with a dual-core 2.6GHz Athlon 64 FX-60 and 2GB of Corsair DDR400 RAM.

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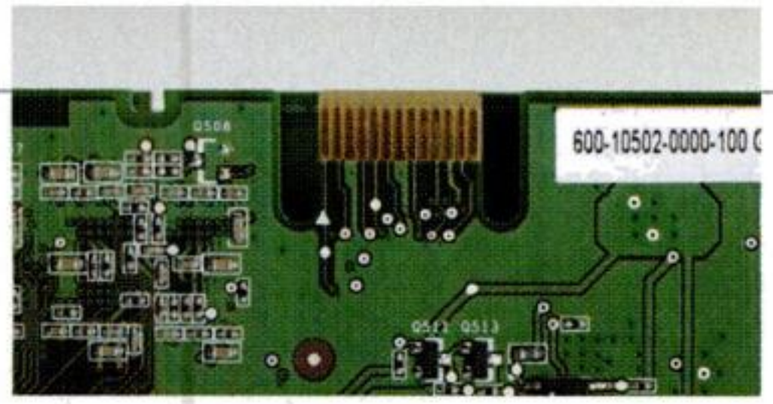

There's an SLI connector, but nVidia is giving system builders first crack at building quad-SLI rigs.

Considering it has two powerful GPUs, how could it not be?

BFG's card had no trouble outrunning a solitary overclocked 7900 GT and a single overclocked 7900 GTX. It beat up on a single stock X1900 XTX, too. But the GX2 had a tougher time challenging two high-end cards running in either SLI or CrossFire mode. For instance, it outclassed a matched pair of overclocked 7900 GT cards running in SLI in only one test: *Quake 4*. Two 7900 GTX cards in SLI, meanwhile, absolutely crushed the single GX2; as did two X1900 XTX's in CrossFire.

We think the 7950 GX2 is a compelling value, especially if you don't have an SLI or CrossFire motherboard. The overclocked EVGA 256MB 7900 GT cards (600MHz core, 800MHz memory) used in our comparison were selling for $360 each at press time, so a pair would cost $110 more than BFG's card and would provide only half the video memory. Meanwhile, the least-expensive 7900 GTX cards we could find were fetching $466 each, or $932 per pair. An ATI X1900 XTX with a matching CrossFire master card costs even more. It's more difficult to place a value on the GX2's HDCP feature, however, because it's unclear whether it will ever be necessary.

—MICHAEL BROWN

BFG GEFORCE 7950 GX2

TWO BRAINS

The fastest single videocard money can buy.

TWO HEADS

Can't run two displays in dual-GPU mode; not as fast as two high-end cards in SLI or CrossFire.

9

MAXIMUM PC KICKASS

$600, www.bfgtech.com

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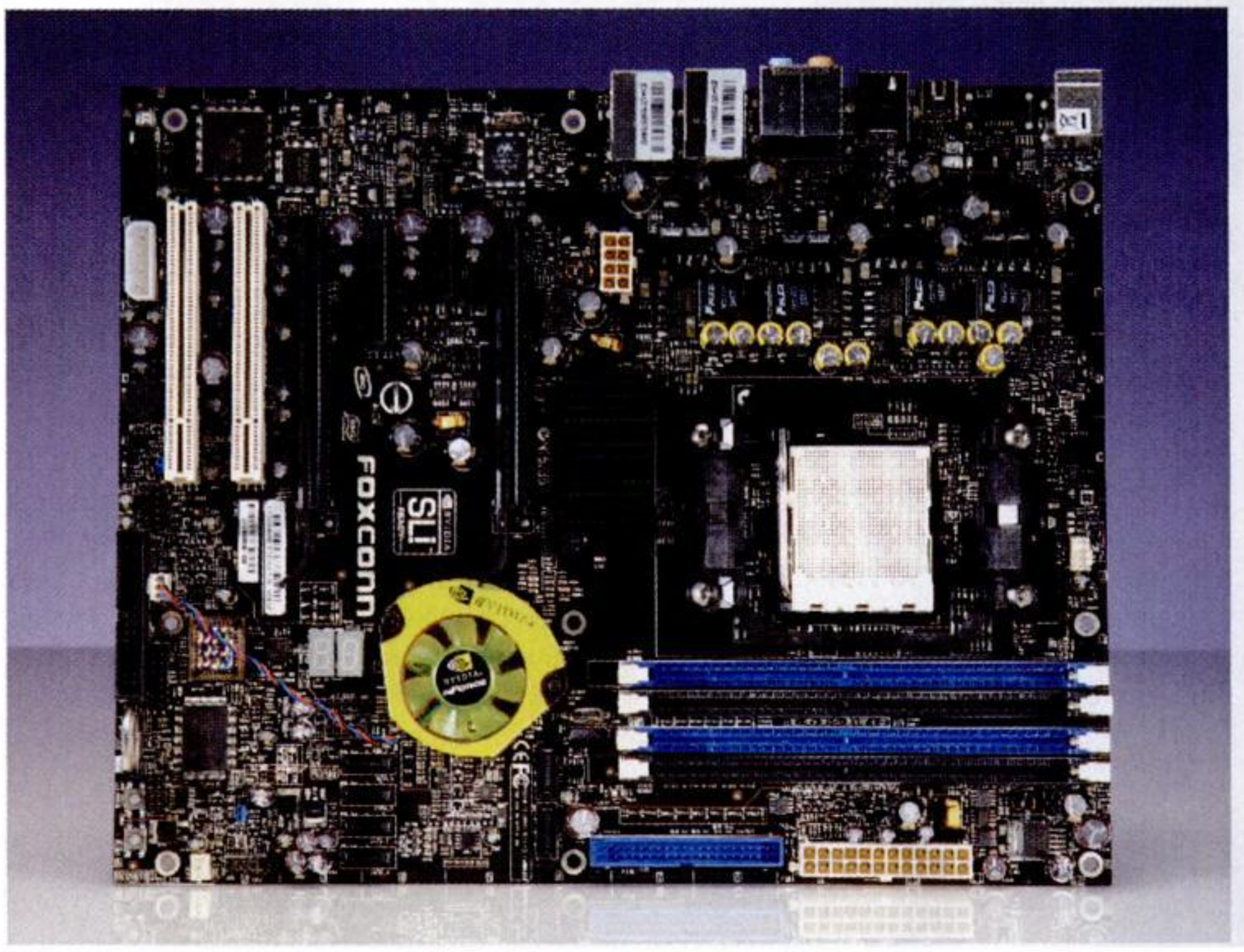
AM2 Arrives!

Two motherboards vie to be the home of your new Athlon 64 CPU

You've lived for months through slow frame rates, weekend-long video encodes, and single-core slowdowns while you patiently waited for AMD's AM2 platform. Fortunately, your long wait wasn't in vain. AMD has finally pulled the wraps off the socket that will take its procs beyond the 3GHz mark, and your patience puts you in the prime upgrade position. All you need to know is which motherboard to buy. We look at two of the hottest contenders to carry you to the AM2 promised land.

—GORDON MAH UNG



nVidia worked closely with Foxconn on its nForce 590 board, even writing the board's BIOS.

FOXCONN C51XEM2AA

If you want to judge nVidia's vision for the new AM2 nForce 590 SLI chipset, look no further than Foxconn's C51XEM2AA. This motherboard is the closest you'll get to nVidia's concept design. In fact, nVidia even wrote the BIOS for this board.

Given this cozy relationship, it's no surprise that the C51XEM2AA supports every new feature of the nForce 590 SLI chipset, including *nTune 5,* which lets you tweak the system from the OS.

The board's overall layout is accommodating except for three gaffes. One mistake is admittedly minor: The LED for POST codes is partially obscured if you run SLI. Far more annoying is the fact that Foxconn placed key components too close together. The RAM slots are so near to the CPU that the heat spreaders on Corsair's SLI-Ready RAM almost touch a standard AVC heatsink. Not good. Also, the green south-bridge fan is dangerously close to the PCI-E retention clip—unless you have carnival-freakshow fingers, you won't be able to remove the graphics card without pulling the whole board out of your PC. Or you can just break off the retention clip completely.

There's plenty of hardware goodness to make up for bloopers, however. We like the four additional LEDs, which indicate which of the PSU's power rails are hot. Inclusion of FireWire B is also a nice touch. Furthermore, Foxconn includes an onboard speaker as well as onboard power-on and reset buttons—all desirable features. And we like that the C51XEM2AA SATA ports are intelligently laid out so you can use all of them easily.

The most exciting aspect of the C51XEM2AA is the highly tweakable BIOS, which is sure to have people scouring the Internet trying to figure out what all the features do. Even if you're not into manually adjusting every option for your overclock, the C51XEM2AA supports Corsair's SLI-Ready RAM, which is intended to provide automatic overclocking of the CPU and RAM. We had so-so luck with the automatic-overclocking feature, though. With a pair of extremely low-latency DIMMs from Corsair, the board was a touch unstable, so we swapped out the modules for a pair of less aggressive modules and experienced no hiccups.

Sporting the same hardware and identically configured BIOSes, the C51XEM2AA and the Asus M2N32-SLI Deluxe Wireless (reviewed below), were virtually neck-and-neck in performance. So read on to see where the differences do lie.

FOXCONN C51XEM2AA

THE FORCE

Well-placed SATA ports and PCI-E slots; full support of all nForce5 features.

MITACLORIANS

Poorly designed graphics-card retention clip.

9

$250, www.foxconnchannel.com

BENCHMARKS

	FOXCONN	ASUS
SISOFT SANDRA COMPOSITE	7,285	7,256
3DMARK 2001 SE	35,722	35,163
3DMARK 2005	11,118	11,030
3DMARK 2006	5,995	6,113
QUAKE III (FPS)	571	570
QUAKE 4 (FPS)	160	155
PREMIERE PRO HDV (SEC)	2675	2693
PHOTOSHOP CS2 (SEC)	279	282
3DDB (MB/S)	1,360	1,313
FEAR (FPS)	200	205

We used an Athlon 64 FX-62, 2GB of Corsair DDR2/800, a Western Digital 4000KD SATA hard drive and GeForce 7900 GTX to test the motherboard performance.

ASUS M2N32-SLI DELUXE WIRELESS EDITION

Asus' modus operandi of late has been to rush out new board designs so far ahead of its competitors that the other guys just seem to give up. Witness the company's A8N32-SLI Deluxe board. In the dual-x16 nForce category, it was the only game in town for months on end.

This time around, Asus enjoys no early lead but the company still manages to add in some nice extras. The AM2-based M2N32-SLI Deluxe Wireless Edition ships with an 802.11b/g Wi-Fi card that supports

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both client and access-point functionality. Asus also opted for beefy (and quieter) heat pipes to cool not only the core-logic chips, but also the board's voltage-regulator modules and capacitors.

The Asus and Foxconn boards are amazingly similar in expansion-card options. Both give you two PCI, one x1 and one x4 PCI-E, and two x16 PCI-E slots. Asus should have done what Foxconn did by swapping the position of the x4 slot with the x1 slot. As it stands, if you run a double-wide graphics card, you'll block access to the x4 slot. We actually prefer the version of the MN232-SLI that's only sold overseas—that board is configured so you can run two dual-slot graphics cards and still drop in a pair of PCI cards.

One of the niftiest items bundled with this board is the Q-Connector kit. Instead of plugging your front panel directly to the motherboard, you plug the power-on, reset, and LEDs into a connector block, which goes into the case. If you need to pull the mobo, just yank out the connector block, and then plug it back in when you reinstall the board, without having to mess with the jumpers. Very trick.

On another note, Asus' board suffers one very glaring problem: the nForce 590 SLI supports six SATA ports but Asus configured the board so two SATA ports are blocked when running SLI. We initially thought the company addressed that by including two right-angle SATA cables, but the cables are angled the wrong way! If you use them, they block the other SATA ports. D'oh! The offense is somewhat lessened by the inclusion of two additional (and accessible) SATA ports on a separate Silicon Image controller card, but the mistake is nonetheless dopey.

When it comes to BIOS tweaking, Asus gives you almost as many switches and knobs to turn as the Foxconn board. However, Asus doesn't support *nTune 5.0* nor its overclocking features from nVidia's Windows applet. Because Asus (like many other board makers) uses overclocking tools and a custom BIOS to differentiate itself from the competition, it doesn't want to risk losing that edge. Custom BIOSes are great, but we'd like to have the Windows app as well.

As we noted in the Foxconn review, we saw near-identical performance between the two boards—not surprising, with both BIOSes set the same. So in the end, the choice comes down to the features that you want and whether you can live with the minor irritations of both boards' wonky component placement.

ASUS M2N32-SLI DELUXE

AIR FORCE

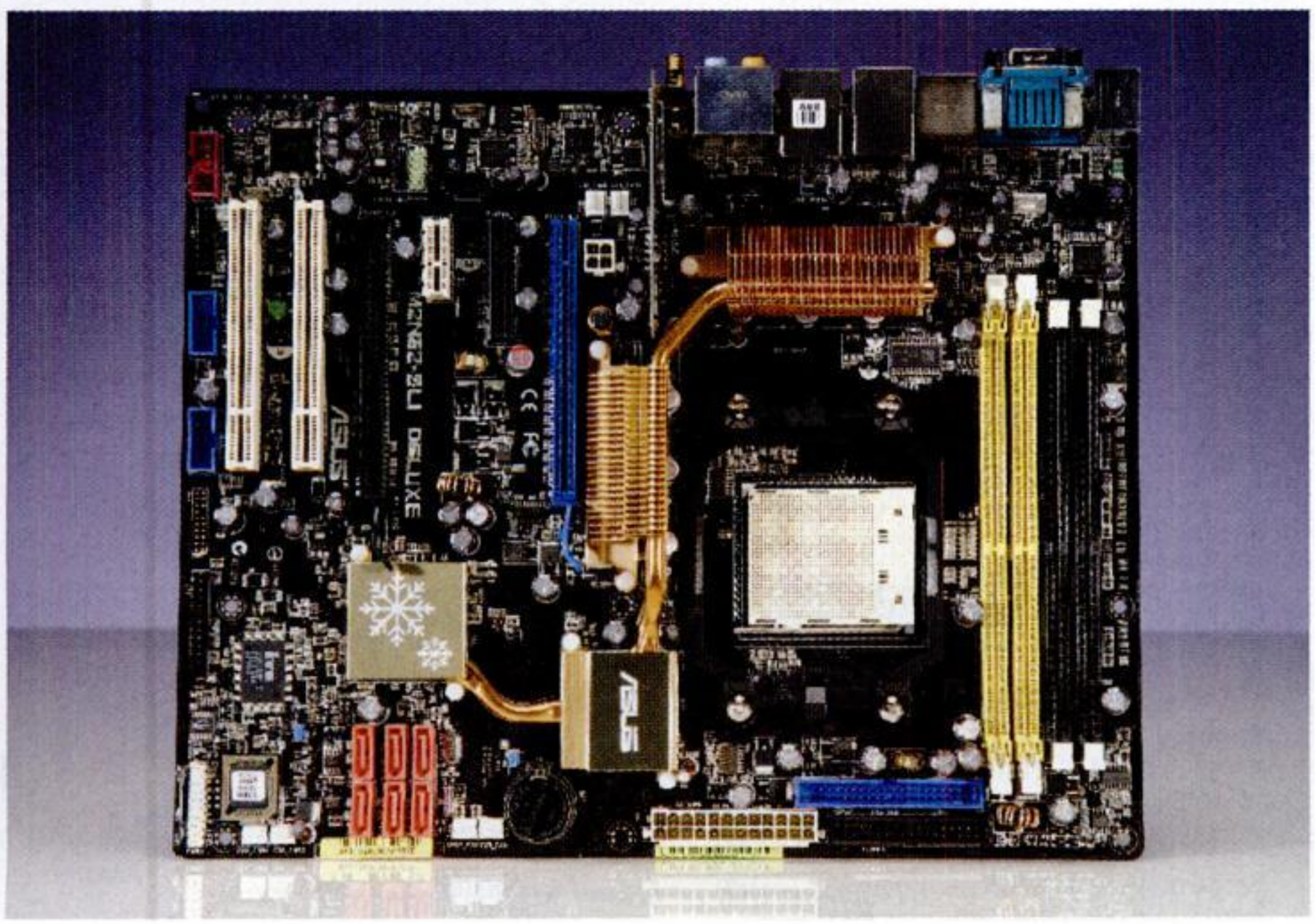
Quiet heat pipes, wireless module, and Q-Connector are pure Asus.

AIR GUITAR

Why offer six SATA ports and then block two of them?

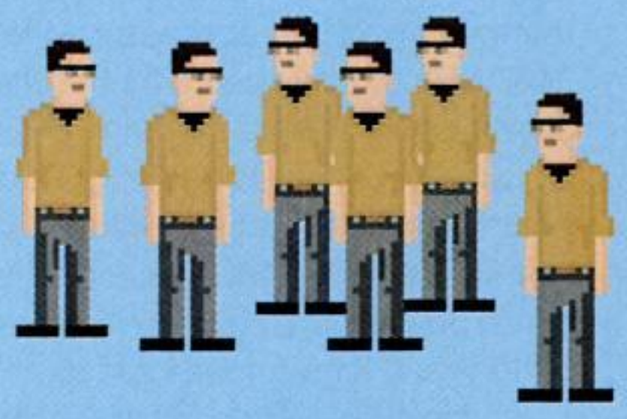
9

$250, www.asus.com



The M2N32-SLI Deluxe features built-in Wi-Fi networking and beefy heat pipes for quiet computing.

{geek}



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Large-LCD Lineup

In search of a primo LCD for this year's Dream Machine

As with all the parts that go into our annual Dream Machine, picking the perfect monitor takes careful consideration. Follow along as we evaluate the latest crop of 23/24-inch LCD panels, in search of a monitor that's as righteous as our rig.

—KATHERINE STEVENSON

DELL 2407WFP

Dell's 2405WFP graced the ranks of last year's Dream Machine, so it's only natural that we consider its successor—the 24-inch 2407WFP. Like last year's model, the 2407 sports a slim bezel, a full range of ergonomic adjustment options, loads of inputs (see Spec box), Picture-in-Picture functionality, and two built-in media readers to handle all formats. It also boasts new, hipper onscreen-display buttons and a revamped interface.

In the *DisplayMate* (**www.displaymate.com**) screen evaluation scripts, the 2407 demonstrated a deep black; a uniform backlight; and strong, though not perfect, grayscale performance. When tasked with reproducing 85 or more steps of gray, we detected subtle differences in hue among the steps, which suggests that the red, green, and blue color channels aren't tracking identically at fine increments of shade. We also saw banding in the horizontal grayscales of 128 or more steps, though the vertical scales were perfectly smooth throughout.

Dell's done it again, offering up a large widescreen panel that does justice to our Dream Machine.

Such slight imperfections won't necessarily show themselves in real-world apps. We looked for any signs of color or detail discrepancies in a series of high-res digital images and a predominantly dark DVD (*Batman Begins*), and found none. In games, Dell's 2407 also held its own, with a picture that was virtually free of redraw errors at its native resolution. All in all, it's a heck of a package—and at a rock-bottom price.

We're put off by a hitch we observed in two different HP LP2465 screens.

HP LP2465

HP's panel matches Dell's in screen size, ergo-adjustability, and OSD offerings, but its port options are limited to two DVI-I (which can carry either an analog or digital signal) and four USB 2.0 ports. HP also throws in a bundled app that provides color-calibration screens for the monitor.

In terms of its *DisplayMate* performance, the LP2465 exhibited good white/gray and black/gray distinction, a uniform backlight, and accurate grayscale reproduction, but the screen stumbled dramatically in our speed tests. We recently added *Pixel Persistence Analyzer* (**www.benchmarkhq.ru/english.html?/be_monitor.html**), which evaluates a monitor's pixel response performance with a stream of image patterns. Here we noticed that images moving quickly across the screen were disrupted by a persistent stutter on HP's panel—but not on the other monitors. Curious as to how this activity might show itself elsewhere, we fired up our game tests. When we moved through the game environments in a similar fashion, the hitch was evident, as were signs of image tearing. We explained the anomaly to HP, received a replacement monitor, and saw the exact same problem. HP engineers subsequently did their own testing, with similar results. They're now working on a fix, so perhaps the LP2465 will be a worthy monitor in time—but for now, you should avoid it.

VIEWSONIC VP2330WB

Viewsonic's VP2330wb enters the fray at a slight disadvantage, sporting a screen that's a full inch smaller than the others here, though it has the same 1920x1200 native resolution. It also has the slight disadvantage of using a hefty power brick for juice—rather than the easy-to-route-and-accommodate power cords that the other LCDs tested use. And while we appreciate the four built-in USB ports, we wish they weren't all located behind the screen—it's nice to have a couple on the side for convenience.

In our tests, we observed some bright splotches on a dark screen due to an uneven backlight—this was the screen's biggest failing. The VP2330 proved capable at grayscale reproduction, though like Dell's entry, it displayed subtle color-tracking errors, which were visible at 65 steps and beyond; and it showed signs of kinks and ripples in grayscales of 256 steps. These issues didn't seem to nega-

DELL 2407WFP

+ POISE
Strong all-around performance; lots of inputs; excellent price.

– POISON
Some grayscale issues keep it from being perfect.

9

MAXIMUM PC KICKASS

$850, www.dell.com

HP LP2465

+ TALENT
Good ergo adjustments, grayscale performance, and color.

– TALON
Strange hiccup in screen action leads to problems in games.

4

$1,000, www.hp.com

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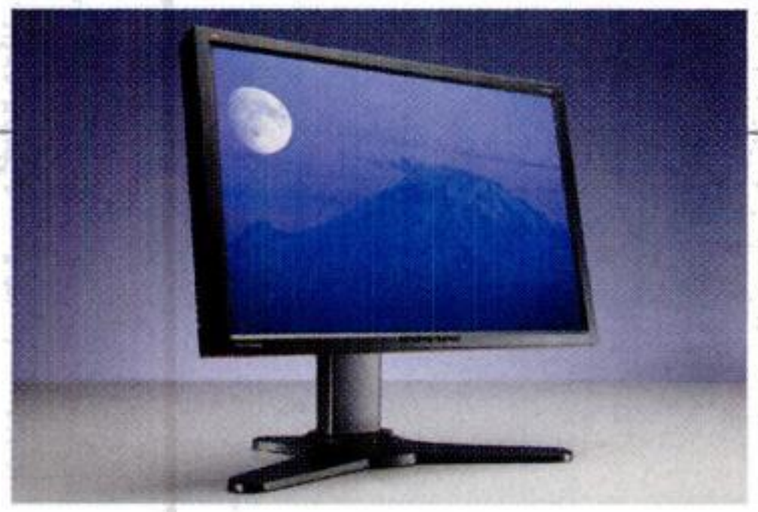


Viewsonic's VP2330 doesn't always get along with some videocards.

Samsung's brilliant picture could come at a cost to detail in darker images.

tively impact the VP2330's ability to handle high-res digital images, games, or the dark ambiance of *Batman Begins.* In such applications, we'd even say the VP2330 performed on par with Dell's panel.

Still, we're wary of synching issues we observed on the two VP2330s we have in our Lab. While the monitors primarily had problems synching with a BFG GeForce 7950 GX2 videocard after a warm boot, or restart, we had a similar single occurrence with an EVGA 7950 GX2, as well as with an ATI X1900 GTO card, in different PC environments. A cold boot fixes the problem, but we don't expect these types of problems, particularly when we're paying top dollar for a monitor.

SAMSUNG 244T

Samsung's 244T toes the line with the same high-degree of ergonomic adjustability that these others offer. And like Dell, Samsung throws in the full complement of connections—albeit just two, rather than four, USB ports—and PiP, but no media reader. Samy also throws in its signature *Magic Tune* software for color tuning and calibrating. And its OSD offers the greatest degree of color adjustment, with slider controls for both hue and saturation.

Samsung's monitors almost always stand out with incredibly vibrant, vivid colors. And sure enough, the 244T's picture looks brighter and more intense than the other monitors here. It's especially noticeable in a visually rich game like *Far Cry,* or when viewing colorful high-res digital pictures. But in *DisplayMate* we noticed that the 244T compresses the dark end of the grayscale range, with little distinction between the darker grays and black. It could be that by increasing the intensity at the light end—to achieve its eye-popping picture—Samsung is sacrificing its darks. We lowered the gamma—it's nice that Samsung lets you do this—and it seemed to help, as do the presets for different content. Set to Entertainment mode, the dark scenes in *Batman Begins* weren't troublesome.

We must note that Samsung's monitor revealed a flaw similar to the one in HP's screen in *Pixel Persistence Analyzer*. We saw hitches in the 244T's picture, but they were only sporadic, and we couldn't detect a problem in any real-world tests, so we're not dinging it severely.

VIEWSONIC VP2330WB

7

CHARM
Performs well with a variety of applications.

HARM
Synching problems with certain videocards; pricey.

$1,300, www.viewsonic.com

SAMSUNG 244T

8

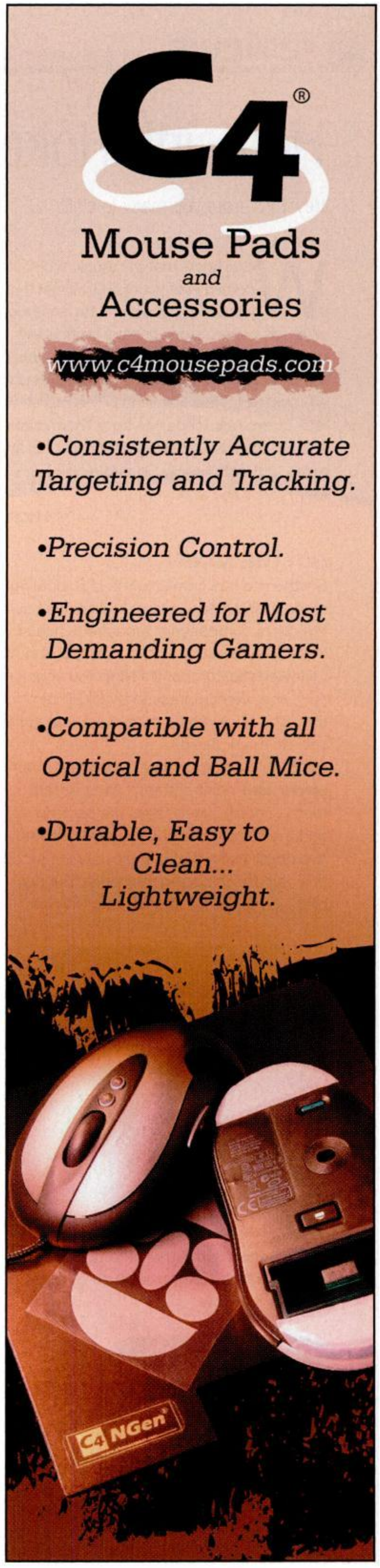
SWIMSUIT
Brilliant colors, ergo options, and lots of inputs.

LAWSUIT
Weak at the dark end of grayscale; curious intermittent picture hitch.

$1,100, www.samsung.com

SPECS

	DELL	SAMSUNG	HP	VIEWSONIC
SCREEN SIZE	24 inches	24 inches	24 inches	23 inches
NATIVE RESOLUTION	1920x1200	1920x1200	1920x1200	1920x1200
INPUTS	DVI, VGA, S-Video, component, composite, four USB 2.0	DVI, VGA, component, composite, two USB 2.0	Two DVI-I, four USB 2.0	DVI, VGA, four USB 2.0



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Heatsink Hokey Pokey

Hey, CPU—are you ready to chill?

We all know that the stock cooler that comes with your CPU will get the job done, but it won't be exceptionally cool, nor are stock coolers particularly quiet or attractive. Aftermarket coolers, on the other hand, are all of the above, and usually cost just a few Hamiltons. This month we look at two high-end units from Thermaltake and Scythe that are designed to run cool and quiet, and install easily. To quote *Half-Life's* G-Man: "We'll see about that."

—JOSH NOREM

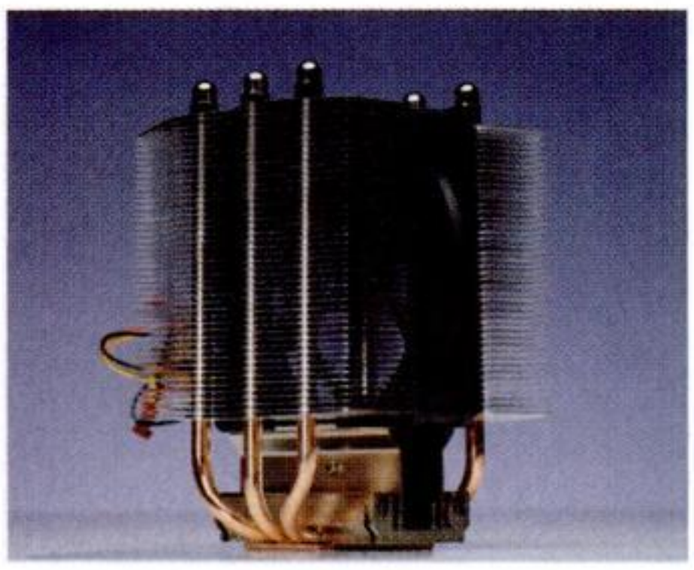
SCYTHE MINE

Scythe is a newcomer to the U.S. cooling market, and is trying to establish itself as the go-to company for monstrous heatsinks that—like Zalman's—offer quiet cooling. We reviewed the company's Ninja Plus cooler in July, and were impressed by its silent operation. The Mine runs just as quiet, but suffers several major flaws.

Problem number one: It can't be mounted on our zero-point system's Asus A8N32 motherboard. Here's why: The cooler's retention mechanism for AMD systems sports two small levers that you must swing around in an arc to lock down the cooler, but one of the arms comes into contact with our mobo's chipset cooler. When questioned about this issue, Scythe simply said this cooler will not work with this mobo. We pointed out that the MSI K8N Diamond Plus also has a north bridge heatsink. The response? Mine will work with that board, if you're willing to cut the locking lever, which seems like an extreme measure to us. This is a major oversight on Scythe's part, obviously, and we're baffled that the company neglected to test compatibility with two prominent passively cooled motherboards.

We ended up installing the Mine on an Asus A8N Deluxe, and the fit was just fine, but the installation itself was a pain in the butt. The metal mounting levers are very small and swing within a metal groove, which makes them very difficult to secure. It's definitely one of the worst retention methods we've encountered.

These faux paus are regrettable because the Mine is a fantastic cooler. It's so quiet you literally cannot even hear it running, and its temperature during our tests was superb. Its "midship" 10cm fan helps move air through the case (and heatsink), and can be replaced with a fan as large as 12cm, if you so desire. Motherboard removal is not required for installation, regardless of platform (it's compatible with every CPU socket available, including AM2).



The Mine's 10cm "midship" fan can be replaced with a fan of any size your heart desires, from 6cm all the way up to 12cm.

SCYTHE MINE

MINE
Very quiet, fantastic performance, and no clearance issues.

YOURS
Doesn't fit on our A8N32 mobo, and is too hard to install.

5

$54, www.scythe-usa.com

THERMALTAKE TYPHOON MINI

This cooler's predecessor is the Big Typhoon—a great cooler, as long as your PC doesn't have a side door. You see, that cooler is so damn big that it extends almost all the way to the door of most cases, depriving the cooler of a source of fresh air.

The Mini Typhoon is not for tech stragglers. It only works on AM2, K8, and LGA775.

Thermaltake recognized the issue and thus the Mini Typhoon was born.

The Mini's "open frame" fan design allows it to suck air into its maw from above, and cool the CPU as well as the components around the CPU socket. In another major improvement, Thermaltake has totally revamped its retention mechanism with this cooler. Rather than using long screws and requiring mobo removal for LGA775, you now just drop the appropriate fastener over the base plate and secure it using the stock bracket (for both AMD and Intel). Issues we encountered: There's no way to secure the retention mechanism to the cooler, so it has a tendency to move around when you're mounting the heatsink. During testing, we thought we secured the retention arm only to look down and see that the whole mechanism was misaligned. We're also surprised that the arm hits the unit's fins when you're locking it into place, so you have to bend it outward, which seems like a design flaw.

Its cooling performance is totally acceptable, but it's not a huge improvement over the stock cooler. It's relatively quiet, but does run louder than other high-end coolers we've tested. The only time it was "silent" was when we enabled the Q-fan setting on our mobo, which reduces fan speed for quiet operation. With the fan speed lowered, it cooled only as well as the stock cooler, making it more of a lateral move than an upgrade.

THERMALTAKE TYPHOON MINI

THAI FOOD
Easy to install, cools decently, and cools entire CPU socket.

TYPHOON
A smidge noisy, and the retention bar slides around.

7

$50, www.thermaltake.com

AMD FX-60 TEMPS

	SCYTHE MINE*	MINI TYPHOON	STOCK
IDLE (C)	**33**	41	44
100% LOAD (C)	**48**	49	53

*Best scores are bolded. All temperatures were measured from the onboard sensors using the utilities provided by the motherboard manufacturer. Idle temperatures were measured after 30 minutes of inactivity and full-load temps were achieved by running CPU Burn-in for one hour. *Scythe Mine was tested on an Asus A8N Deluxe SLI due to incompatibility with our zero-point Asus A8N32 motherboard.*

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Small Formfactor Fisticuffs

SFF's break the laws of physics

Trying to get a lot of hardware into a small case is like trying to approach the speed of light—the harder you try, the more difficult it gets. You can only jam so much hardware into a box before something breaks, overheats, or shorts out. So just as subcompact cars have grown into compact cars, today's microATX small formfactor (SFF) rigs can hold much more hardware than yesterday's. We look at a couple of them here.

—GORDON MAH UNG

With too many sharp edges and too high a price, the Qmicra's weaknesses overcome its strengths.

PC DESIGN LAB QMICRA

So you want to create a DIY PC using all of today's white-phosphorous-hot components and the requisite hefty power supply—and you want it to be small? Impossible? Maybe not.

PC Design Lab apparently had that scenario in mind when it designed the Qmicra SFF. Although this case takes its styling cues from the Amish big-barn era, when you remove the two support bars, unscrew the feet, and pop off the lid, you have amazingly easy access to the internals—more so than with other SFFs.

We installed a microATX motherboard, a PC Power and Cooling 510 PSU, and even a GeForce 7950 GX2, with no problems. Amazing. The case is a bit unfinished, with a few too many sharp edges, but it's perfect for modders. You can strip the shell all the way down if you want. You can also mount four hard drives, although we think the drive-retention mechanism is under-engineered. We can't imagine hanging four big drives from a piece of aluminum that wobbles back and forth.

PC Design Lab has obviously put some thought into airflow. The case has mounts for four 8cm fans—two in the front and two in the back—a setup that should create a BTX-like air channel throughout the case. That's well and good, but for the Qmicra's $380 price tag we'd expect the fans to be included. The rig is also missing front USB ports. In the end, we think the case is just a bit rough and flimsy for the kind of cash PC Design Lab is asking.

PC DESIGN LAB QMICRA

+ FIAT 850
It's easy to add almost any parts to the Qmicra's roomy interior.

− BUGEYE SPRITE
It's expensive, rough, and lacks basic amenities such as front USB and FireWire ports.

6

$380, www.pcdesignlab.com

ULTRA PRODUCTS MICROFLY

At first glance, Ultra Products' MicroFly might look like a clone of Aspire's X-QPack (reviewed October 2005) but it isn't. The MicroFly is longer by about an inch, which lets you use a standard power supply (although the rig comes with a PSU rated for 400 watts). The MicroFly is also windowless, and we prefer this design. After all, you should only flaunt your innards if they're worth flaunting. And let's be frank: Most of us don't have the patience to pull off a wiring job worthy of close inspection.

Access to the MicroFly's internals isn't quite as easy as with the Qmicra, but you do get a mobo tray. A single 8cm fan mounted in the front sucks air in while a rear-mounted 12cm fan handles exhaust duties. The cooling configuration is better than that of Silverstone's SG01 (another "medium" formfactor rig, reviewed January 2006), but probably not as good as the Qmicra's, which pushes more air over the videocard.

In hardware, the MicroFly can handle a two-slot graphics card and up to two hard drives. And the MicroFly's relatively long body can house a greater assortment of optical drives. Unfortunately, the MicroFly feels just as flimsy as the Qmicra (and Aspire's X-QPack, for that matter). The front handle doesn't feel secure when the system is *empty*, let alone full of hardware.

The real problem the MicroFly and the Qmicra face, however, is that they're both straddling the SFF and standard tower worlds, awkwardly. Attempts at elongating and widening the SFF design have pushed these formfactors beyond even "medium." The MicroFly, for example, is more than three inches wider than a standard tower case, and it looks huge. It begs the question: Why not just use a standard tower?

Capable of mounting a standard PSU, the MicroFly's main weakness is its size—it's really not that small.

ULTRA PRODUCTS MICROFLY

+ DATSUN ROADSTER 2000
Much improved over Aspire's X-QPack, the MicroFly even takes a standard PSU.

− ALFA ROMEO SPYDER
A flimsy front handle could send your system tumbling.

8

$100, www.ultraproducts.com

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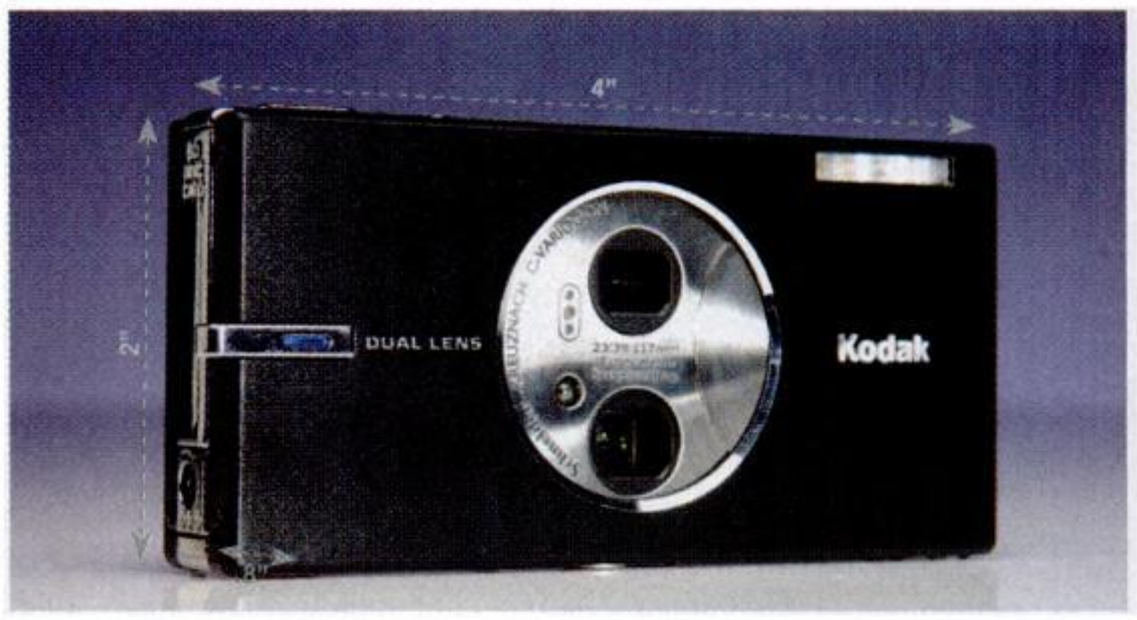
Kodak EasyShare V570

It's like having two cameras in one—sorta



The V570 is the first ultra-compact point-and-shoot to sport two lenses, and two image sensors.

Ever have that problem where you want to take a nice group picture of your friends, say at the Grand Canyon, and you just can't get 'em all in the frame? So you ask them to keep backing up a step and before you know it… oops!

Well, this camera will help make your next vacation a bit safer. The V570 packs two lenses into its sleek body: an ultra-wide angle (23mm) and a 5x optical zoom (39mm-to-117mm). This amounts to all the standard capabilities of a point-and-shoot, plus the ability to go to wide-angle for group portraits and the like.

Of course, with dual lenses you're talking about dual 5-megapixel image-sensors, which translates into a higher price compared with competing single-lens cameras. We think the added functionality of the dual-lenses is worth it, especially when you take into account the camera's overall solid image quality, particularly indoors. There is, however, a noticeable hitch in the LCD viewfinder image when the camera makes the jump from 39mm to 23mm—you must depress and re-press the zoom controls to make the viewfinder register the switch.

Call us old-school but we miss having the optical viewfinder in addition to the LCD, for composing shots. That said, the 2.5-inch LCD is crisp and performs well in all but the brightest outdoor settings, and the camera's controls, including automatic scene modes, are easy and comfortable to use. A 30fps MPEG-4 movie mode is offered, but the video suffers from severe grain, rendering it an afterthought at best.

An included panoramic picture mode guides you through the process of snapping up to three pictures, providing image overlays on the LCD and then stitching them together in-camera. This is pretty cool, as you can immediately view the results—which were quite good in our tests—and determine whether you need to retake the shots.

If you're looking for simplicity and flexibility, the V570 is well worth consideration. (Note: Kodak has already released an updated 6-megapixel version, the V610, with integrated Bluetooth capabilities and a 10x optical zoom, for $50 more.)

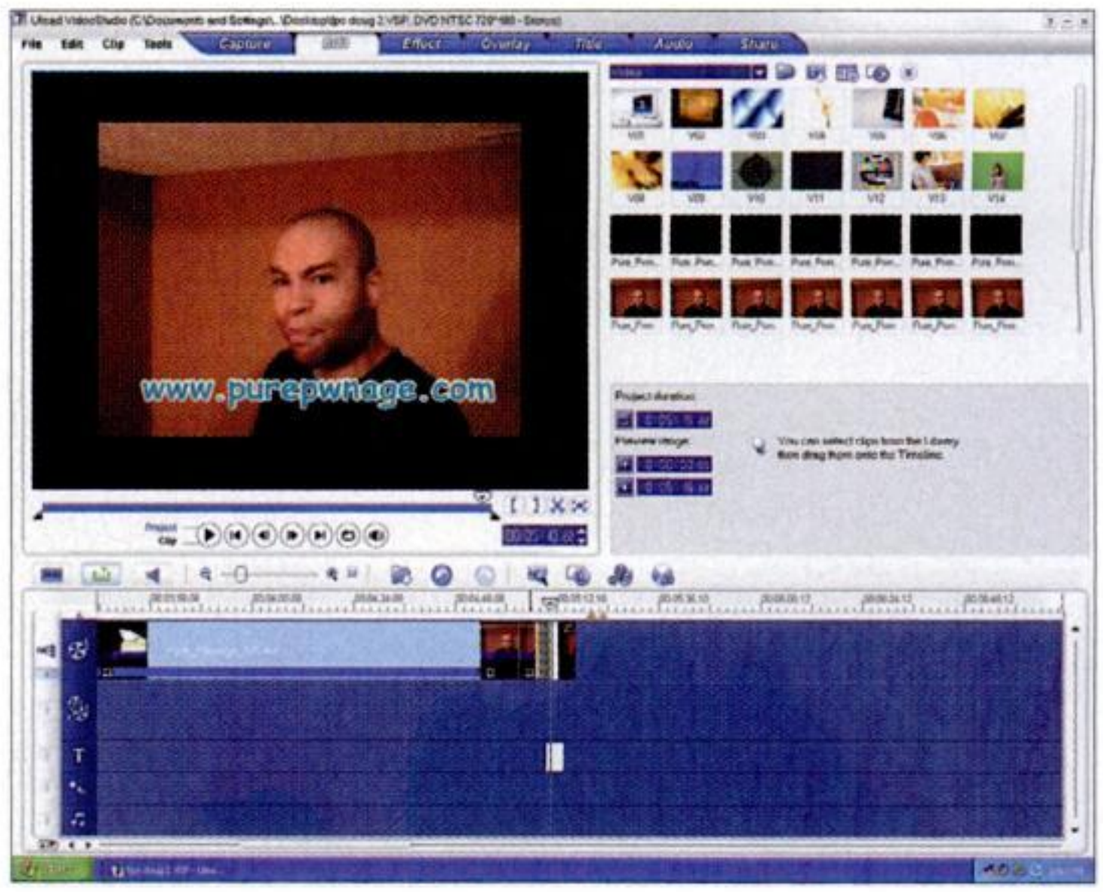
—STEVE KLETT

KODAK EASYSHARE V570 **8**

$400, www.kodak.com

Ulead VideoStudio 10 Plus

The quick-and-dirty video editor



***VideoStudio 10 Plus* retains the series' familiar interface, while adding several new key features.**

We're taking the Three Bears approach here. If *Premiere Elements 2.0* (reviewed in March 2006) is too complex and Pinnacle's *Studio Plus 10* (reviewed in April 2006) is too buggy, Ulead's *VideoStudio 10 Plus* could be just right for people who want the fastest route from DV cam to the TV screen.

***VideoStudio 10 Plus'* new features include an shake-reduction filter to bring it up to par with its competitors, and support for HDV, multiple overlays, and MPEG-4 and Divx output. And the program includes a generous stable of powerful video effects—we particularly liked the duo-tone effect.**

For performance reasons, you won't be editing HDV content at native resolution. *VideoStudio 10* uses a proxy video file on which to do your edits and transitions. Then the project is output at full resolution—supposedly. We were unable to test the feature using an HDV MPEG-2 file we captured with another application. We're not sure why; it could just be an incompatibility with our encoding method.

One thing we are sure about, however, is performance. *VideoStudio 10* just didn't seem as responsive as the other applications we've tested. A very noticeable and annoying one or two second lag occurs before video playback starts or stops. We also don't like the fact that video playback stops when you change the scale on the timeline. When you're nose-to-CRT looking at a scene and you want to zoom out of the timeline, you don't want everything to come to a screeching halt. Doing a frame-by-frame edit of a clip was just downright clunky and painful. But our main complaint is with the poor documentation of the controls. For example, instead of including the keyboard command in a pop-up bubble when you hover over the soft button, you have to dig into the back of the manual to find the shortcuts.

While we think *VideoStudio 10* is great for someone who wants to perform simple, straightforward edits, more ambitious editors are better off with *Premiere* or Magix' *Movie Edit Pro 11* (which we reviewed in July 2006).

—GORDON MAH UNG

VIDEOSTUDIO 10 PLUS **7**

$100, www.ulead.com

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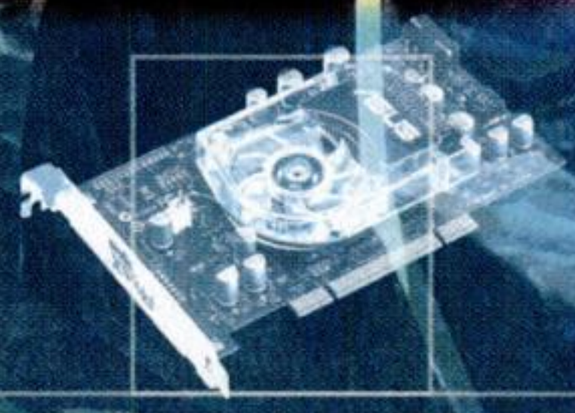

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eusa.asus.com/maxpc/physx

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USB Flash Flood

Is one of these the key to your heart?

Even though these USB keys look like garden-variety thumb drives; there's more than meets the eye with this group. Kingston's DataTraveler is chock-full of special software, OCZ's Mini-Kart is the smallest key we've ever tested, and Crucial's Gizmo Overdrive is light-speed fast. Let's take them all for a test drive to see if there's a worthy replacement for that hunk 'o' junk on your key chain.

—TODD HASELTON

KINGSTON DATATRAVELER

The Kingston DataTraveler is like the 1969 Mustang of USB drives; it looks old but has a ton of power under the hood, thanks to its preinstalled U3 software. We last looked at the U3 bundle in April 2006, and were unimpressed by the included apps—most of them being useless or meant for purchase. This version of the bundle still leaves us wanting more, but we have to admit that it covers the basics. Utilities such as *Skype, Trillian, Thunderbird,* and *Firefox* are must-have tools, and they come on the key, which is convenient.

The Kingston DataTraveler sports the improved U3 interface, which lets you run all your favorite apps right off the key.

For folks not in the know, the U3 interface behaves like a Windows Start menu in your system tray. You click it to access software, look at the drive's contents, or adjust settings. Everything runs from the key, so you can plug it into any PC and have all your favorite apps, bookmarks, email, and so forth wherever you go. You can even password-protect the drive, although the contents aren't encrypted.

The drive itself is rather bland-looking, and is a standard USB-key size. It's made of plastic, so while we wouldn't go BASE jumping with it, it held up just fine during our grueling Pocket Test.

Drives like the DataTraveler are a godsend for travellers who frequent Internet cafes, but we don't think that's a very common scenario. For normal usage, the DataTraveler is simply a solid key, nothing spectacular.

KINGSTON DATA TRAVELER

SCORING

Decent software bundle and good security.

SNORING

Looks outdated and cheap.

8

$50 (2GB), www.kingston.com

CRUCIAL GIZMO OVERDRIVE

Crucial pulled out all the stops with its new Gizmo Overdrive key. This drive roars past everything but Corsair's fastest offerings.

The Gizmo's read speeds are more than twice as fast as the other drives' and its write speeds are 30 percent faster. This kind of performance has a price, however, as the Gizmo is twice as expensive per gig as other keys we've tested.

Aside from its ability to swallow files whole, the Gizmo includes awesome security, dubbed *PortableVault.* It lets you add files and folders into a 256-bit Blowfish-encrypted partition. If you like to regularly back up the data on your key (never a bad idea), *PortableVault* includes a handy backup utility that can also quickly restore your files in case your key gets accidentally formatted.

For portability, your options are to carry the Gizmo in your pocket, or to wear it around your neck, using the included foot-long lanyard. You cannot attach it to a key chain.

Crucial's Gizmo Overdrive has a silly name but plenty of speed. It's one of the fastest flash memory keys we've ever tested.

CRUCIAL GIZMO OVERDRIVE

BACKPACK

Fast speeds, encryption and backup software, handy lanyard.

FANNY PACK

Twice as expensive as other keys.

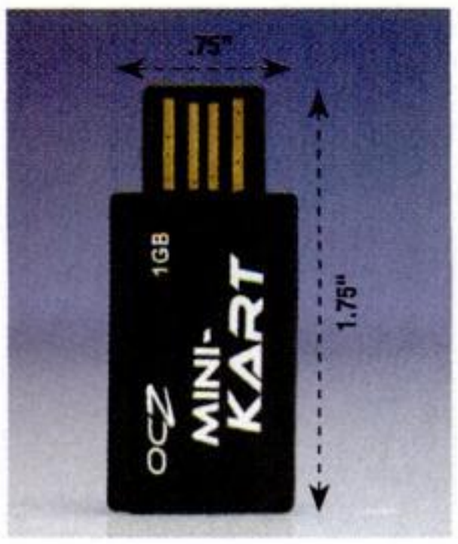
9

MAXIMUM PC KICKASS

$96 (2GB), www.crucial.com

OCZ MINI-KART

The Mini-Kart is so small it could get lost in a bag of potato chips if you weren't careful. Luckily, an included lanyard helps you keep track of the wee device. Instead of the standard rectangular metal USB port, the Mini-Kart's pins are out in the open—it doesn't even have a cap. Seems iffy, but we ran the Mini-Kart through our rigorous Pocket Test, and it (and our data) survived without any problems.



OCZ's Mini-Kart is so thin it could easily slide into your wallet.

The Mini-Kart held its ground against the competition in speed tests, and did so without all the extra physical bulk of the other products. The diminutive size is really the Mini-Kart's main selling point. It doesn't include any software at all, which we'd normally ding a drive for, but its low price makes us a little more lenient. If you don't care about security software or have already purchased your own, by all means take the Mini-Kart plunge.

OCZ MINI-KART

BIG CAPACITY

Ultra small, and you won't lose the cap because there isn't one.

NO CAP

No software bundle, and exposed connectors.

8

$28 (1GB), www.ocztechnology.com

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Third-Gen Pre-N!

A case of premature certification

No sooner had the IEEE's 802.11n Task Group given its stamp of approval to a new, higher-speed wireless networking standard—known as 802.11n Draft 1.0—than chipset manufacturers began introducing new parts designed to that proposal, and promising the parts would be compatible with whatever the final 802.11n standard ends up being. We review two new wireless routers based on such parts this month, and we'll look at two more next month.

There's just one problem: When the members of the larger IEEE 802.11 Working Group got their chance to vote on the proposed standard, they sent their colleagues back to the drawing board—just as these "Draft N" products were hitting store shelves. So does that mean you should avoid these products? Let's find out.

—MICHAEL BROWN

If Buffalo's AirStation Nfiniti router is any indication of the state of 802.11n, we're fortunate the IEEE membership gave the proposed standard the thumbs-down.

BELKIN N1 WIRELESS ROUTER

Belkin picked Atheros' XSPAN chipset for the N1, which we tested with the company's matching N1 Wireless Notebook card. Although the N1's formfactor is very similar to Belkin's earlier "Pre-N" MIMO router, the resemblance ends as soon as you power it up: Six blue diagnostic LEDs light up in sequence to help you through the installation process.

Beginners will appreciate how easy Belkin made its N1 wireless router to configure, but more-experienced users might be put off by the abundance of blue LEDs.

The lacquer-black enclosure is attractive, but we can't decide if the LEDs make the device look too newbie-friendly, or just plain gaudy. Either way, the diagnostic LEDs show you exactly where the problems with your connection lie—making this router a nice fit for wireless-networking neophytes.

Belkin advertises a staggering 300Mb/s transmission rate for the N1, with this disclaimer: "300Mb/s is a physical data rate. Actual data throughput will be lower." We achieved an impressive unencrypted TCP throughput of 129.7Mb/s with our notebook PC in the same room as the router (see Environment 1 in the benchmark chart), but speeds dropped quickly as we introduced distance and interior walls. In Environment 2 (25 feet from the access point, with four gypsum walls in between), TCP throughput dropped to 72.7Mb/s. And in Environment 3 (75 feet from the access point on an outdoor patio), TCP throughput dropped to 62.3MB/s. If you absolutely can't wait another year for the interoperability that the real 802.11n standard will bring—and you can't get enough of blue LEDs—Belkin's N1 is a good choice.

BUFFALO NFINITI DRAFT-N WIRELESS ROUTER

A big yellow button on the Nfiniti's box screams "Exceed Wireless Limits!" But in our experience, the only limit Buffalo managed to exceed is the one governing hype. This router, powered by Broadcom's Intensi-Fi 802.11n-draft chipset, was not only shockingly slow, it also delivered extremely poor range.

Buffalo's AOSS (AirStation One-Touch Secure System) is supposed to make setup as easy as pushing a button on the router and one in the matching notebook adapter's driver software, but the mating ritual failed to consummate each of the five times we attempted it. Configuring the system manually was nearly as frustrating, thanks to third-rate documentation.

But the Nfiniti's biggest deficiencies are throughput and range: Even at close proximity to the access point—within five feet—data transfers to the Nfiniti Wireless-N adapter in our notebook occurred at a measly 27.1Mb/s. Throughput dropped to a dismal 8.0Mb/s when we moved outdoors—and then our connection failed altogether. Pathetic.

BENCHMARKS

	BELKIN N1	BUFFALO DRAFT-N
TCP THROUGHPUT IN ENVIRONMENT 1 (MB/S)	**129.7**	27.1
TCP THROUGHPUT IN ENVIRONMENT 2 (MB/S)	**72.7**	26.8
TCP THROUGHPUT IN ENVIRONMENT 3 (MB/S)	**62.3**	WNR

Best scores are bolded. TCP throughput measured using Ixia's QCheck network benchmark utility.

BELKIN N1

IMPLANTS
Super-easy setup and troubleshooting; very good range and speed.

DENTURES
Puts on an unwelcome light show; might be incompatible with real 802.11n gear.

8

$150, www.belkin.com

BUFFALO NFINITI DRAFT-N

FILLINGS
AOSS works with the Nintendo DS!

CROWNS
Slower than molasses in a Vermont winter; awful range.

3

$150, www.buffalotech.com

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USB Hard Drive Huddle

More capacity than flash storage, but are they worth the cash?

Flash-based USB keys are awesome, but sometimes you need a little more storage than a 4GB thumb drive delivers. What's a portable-storage maven to do? Enter the USB hard drive.

—TODD HASELTON

VERBATIM STORE 'N' GO 4GB

Verbatim's Store 'n' Go offers sassy looks and an awesome software package named *Ceedo Mobile Launchpad.* When the drive is inserted into a USB port, something similar to the Windows Start menu appears in the middle of the taskbar. This menu lets you run a variety of free programs right off of the drive itself. The options include *BitTorrent, ICQ, AIM,* as well as a handful of media players, photo editors, and security downloads. You can also use your *Firefox* profile, complete with bookmarks, cookies, and preferences at any given computer.

The Verbatim Store 'n' Go apes the iPod's stark exterior, but adds sass with a few splashes of teal. How cute.

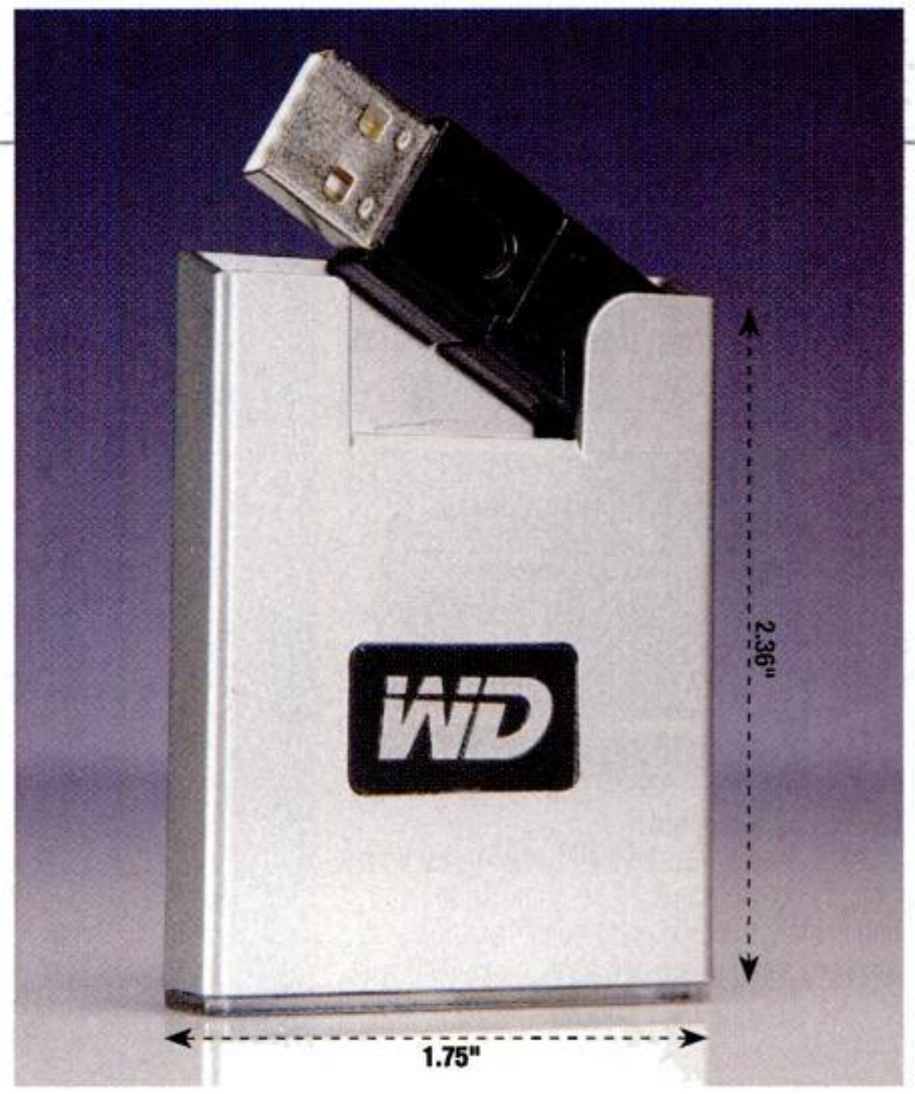
The Store 'n' Go's read/write speeds (469 and 623 seconds, respectively) were faster than the Western Digital drive here, but more than a minute behind the speedy PNY Attaché.

The Store 'n' Go is a little overpriced at $130, since it has less capacity than the other drives tested here. We like the software bundle, though—and would be even more enthused about it if it had some basic encryption software.

WESTERN DIGITAL PASSPORT POCKET 6GB

The Passport Pocket is slow. *Way* slow. Its read speed of our 3GB test file (590 seconds) was two minutes slower than the other drives', and its write speed (636 sec) was three minutes slower than the PNY's (reviewed next). That's ridiculous.

However, the Passport Pocket redeems itself slightly with the included *WD Sync* software (available from Western Digital's website). With the software, you can sync desktop folders and files, including *IE* and *Firefox* Favorites, desktop wallpapers, folders, etc. We weren't able to securely surf on other computers; all of our temporary Internet files were left behind.



WD's drive is the only one here that includes any encryption software, but it's absurdly slow.

The *WD Sync* software also allows you to password-protect the drive, a feature none of the others in this roundup offer. The drive also stores your contact information, so in the event the drive is lost, the person who finds it can easily return it to you.

The drive is very sturdy and solid, and comes with a removable rubber case (not shown) that fits like a wetsuit—it's impossible to get on or off. The USB port is very well designed, however, with a swiveling port head that makes plugging the drive into a crowded USB port much easier.

Yes, it's slow as hell, but it's amazingly affordable and highly portable. It's also the only drive here to sport encryption software, and that's a big feather in its cap.

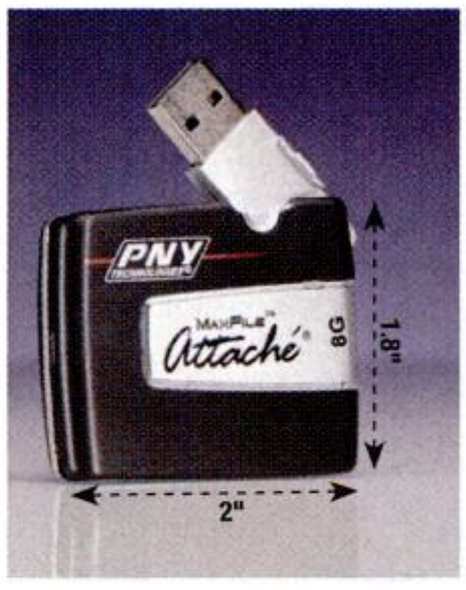
PNY MAXFILE ATTACHÉ

The PNY drive not only sports the most capacity in this roundup, it's also the fastest. It blew the others out of the water in our 3GB read/write test. Its read speed (361 seconds) was an incredible minute and a half faster than the Verbatim drive, and its write speed (430 seconds) was an ass-kicking three minutes faster than both the Verbatim and WD models. It's a good thing this drive is fast, because it's lacking in almost every other regard.

The Attaché has an incredibly flimsy "flick-out" USB head that rotates 180 degrees for easy access, but feels like it could snap off at the slightest touch. The rest of the unit is just as chintzy, despite its advertised "durable anodized aluminum housing." It's more like a plastic, aluminum-coated housing.

The Attaché's software package is easy to review, since there isn't one. These days we expect any key to include software, but the Attaché is just a storage bucket.

Sure, the Attaché offers blazing speed, but that's all. We prefer a more well-rounded package when it comes to personal storage.



Speed is this drive's only stand-out feature—it doesn't come with software.

VERBATIM STORE 'N' GO

7

+ ARTSY
Awesome *Ceedo Mobile Launchpad* software included.

− FARTSY
Unnecessarily bulky; expensive; annoying USB cable.

$130 (4GB), www.verbatim.com

WESTERN DIGITAL PASSPORT POCKET

8

+ SYNC
Good security options and desktop synchronization.

− SINK
Very slow; annoying rubber casing.

$100 (6GB), www.wdc.com

PNY MAXFILE ATTACHÉ

7

+ BOB BARKER
Faster than other drives tested; cheap storage.

− BARKING DOGS
No bundled software; flimsy USB head.

$150 (8GB), www.pny.com

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Gaming

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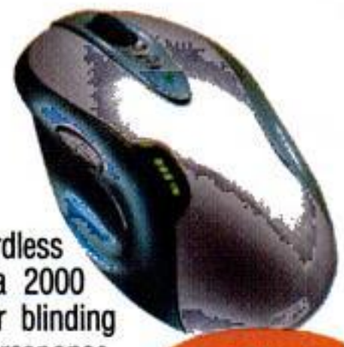
L23-7074 G15 Gaming Keyboard $79.99

Logitech



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Audio

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L23-6334 Z-5500 Speakers $249.99

Logitech

ADD TO CART

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L23-7076 Z-5450 Digital Speakers $349.99

reviews TESTED. REVIEWED. VERDICTIZED

POWERED SUBWOOFER

Altec Lansing BB2001

A judicious application of bass can go a long way toward making up for the sonic shortcomings of a small speaker system. And while no one will mistake Altec Lansing's diminutive BB2001 subwoofer for a Velodyne DD-18, this $50 box positively transformed the company's iM5 portable speakers.

The BB2001 consists of a 5.25-inch front-firing driver powered by a 16-watt amp. Those aren't very impressive specs for a subwoofer, but Altec's little speaker moved plenty of air in our near-field listening tests. And once the tiny iM5 was freed from the hopeless task of producing anything meaningful in the way of low frequencies, the portable speaker system sounded much more respectable—at least at moderate volume.

When we reviewed the iM5 in January 2006, we noted that the speakers distorted badly when overdriven. The BB2001 shares that same characteristic—it doesn't like to be pushed. And although the speaker and amp are housed in a sturdy MDF cabinet, that construction didn't stop our bass torture test (the opening kick drum in Paul Thorn's "Fabio & Liberace") from causing the driver to rattle nervously when we cranked up the volume. But considering that we had to lie on the floor with our ear next to the cabinet to detect the problem, we'll overlook it.

The BB2001 can be paired with any audio system equipped with a crossover and a subwoofer output, including Altec Lansing's iMT1 (for Palm devices), XT2 (for laptops), iMX2 (for XM2go satellite radios), and the aforementioned iM5 (for the iPod). Unlike those battery-powered devices, however, the subwoofer is housebound by its need for AC power.

—MICHAEL BROWN

ALTEC LANSING BB2001 **8**

$50, www.alteclansing.com

ENCRYPTION SOFTWARE

Private Disk

We carry a ton of data on our USB thumb drives that we wouldn't want leaked on the Internet. Whether your key carries your "piss off" letter to your boss, a cache of all your passwords and serial numbers, or those incriminating videos that you took on your last trip to Amsterdam, you need to protect its contents. That's where *Private Disk* comes in.

Using this tiny app—it's less than 2MB—you can encrypt your files using 256-bit AES encryption. Without the appropriate password, your data just looks like a junk-filled file on your drive. Unlike other encryption utilities, which encrypt one file at a time, *Private Disk* creates an encrypted virtual volume, which is perfect for encrypting the contents of a USB key.

Here's how it works: First, you create your encrypted volume, specifying the size of volume you want. Then the app will save a single file containing the info in the volume in a location of your choice. Depending on the size of the encrypted volume, and the speed of your computer, this can be a fairly lengthy process. Then, to access your encrypted volume, you'll double-click the file and enter your password. After the data's decrypted, the contents of the volume will show up in My Computer, and you can read and write files to it, just like any other drive. It's really that easy.

We like to dedicate about half of our 2GB thumb drive to our encrypted volume, and put a copy of *Private Disk* on the unencrypted portion, along with other files we want access to at quick notice. All in all, it's a great little app, albeit a bit pricey for a one-trick pony.

—WILL SMITH

PRIVATE DISK **9**

$45, www.dekart.com

KICKASS

Copyrighted material

ZoneAlarm Internet Security Suite 6.5

Online security, from soup to nuts

Looking for cheap security for your PC? Zone Labs' *ZoneAlarm* firewall is available free for the downloading, as is Grisoft's *AVG* antivirus, Safer-Networking's *Spybot* anti-spyware, and Spampal.org's anti-spam software. But if you're looking for an integrated solution offering all these safeguards and more, *ZoneAlarm Internet Security Suite 6.5* justifies its price.

And unlike some other vendors in this market segment <cough>Symantec, McAfee<cough>, *ZoneAlarm* publisher Zone Labs doesn't start harassing you for a subscription-renewal fee on the anniversary date of your purchase.

This version of *ZoneAlarm Internet Security Suite* (let's call it *ZASS*) has several new features, including automatic spy-site blocking, a gaming mode, and something the company touts as an identity-theft protection service that protects you "even in the physical world." This last claim is fulfilled by a one-year enrollment in a third-party service called Identity Guard Card Theft Protection, billed as "a $29.95 value!"

When you're delivered to this third-party's website (**www.identityguard.com**) indirectly from *ZASS*, you're entreated to also sign up for one of the company's other products with this message: "...for more complete identity protection, the ZoneAlarm team recommends upgrading to Identity Guard Fraud Protection...." This service costs nearly three times what you'll pay for *ZASS*.

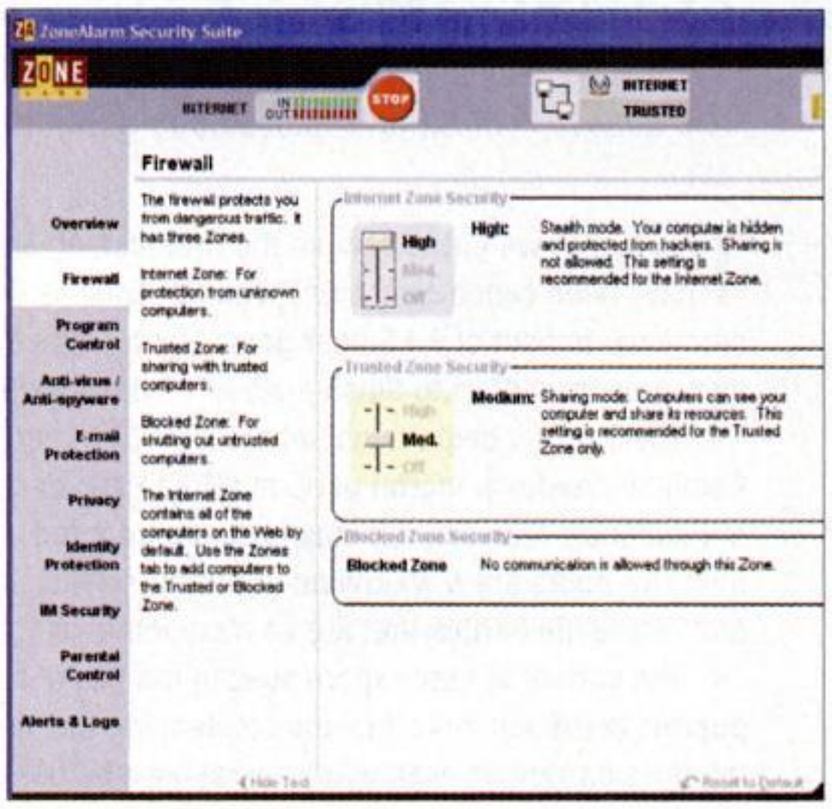
With the free service, you register your credit cards and the company's web-crawlers—which troll sites known to trade in stolen credit-card numbers—will notify you if yours pop up. So what's not to like? Identity Guard feels like a come-on: bait to lure you into signing up for the higher-priced product. But if you do find it to be of value, Zone Labs tells us it plans to continue to offer the basic service for free to customers who renew their *ZASS* subscriptions.

Enough about that; let's get back to some of the new features of the core product. Few things are more annoying than being interrupted in the middle a game by some specious alert from a program that's running on your PC. *ZASS* now includes a game mode that automatically suppresses the program's alerts that require you to make a decision. It also suspends automatic scans and program updates.

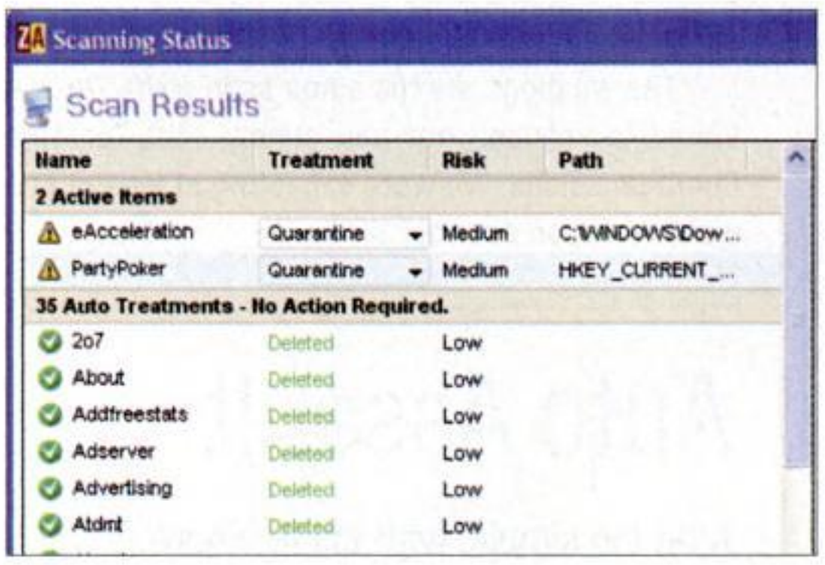
Zone Labs has also added a known spyware site-blocking feature to *ZASS*. Should you try to visit one of these sites, or should a spyware program running on your PC attempt to phone home to one, *ZASS* will automatically block the visit and display an alert. Labeling applications or websites as sources of spyware can be problematic, and *ZASS* cuts vendors a lot of slack in this regard: In a quick test, the program prevented us from visiting **www.gator.com**, but not the P2P file-sharing site **www.limewire.com** or even **www.eacceleration.com,** whose application the program had previously identified as spyware.

On the other hand, *ZASS* spyware scan did turn up two Windows registry entries from programs we had purged from our test platform eons ago: *StopSign*, from the aforementioned eAcceleration, and *PartyPoker* (installed purely in the name of research—honest!). Several other popular anti-spyware programs, including *Spybot*, had failed to detect these entries.

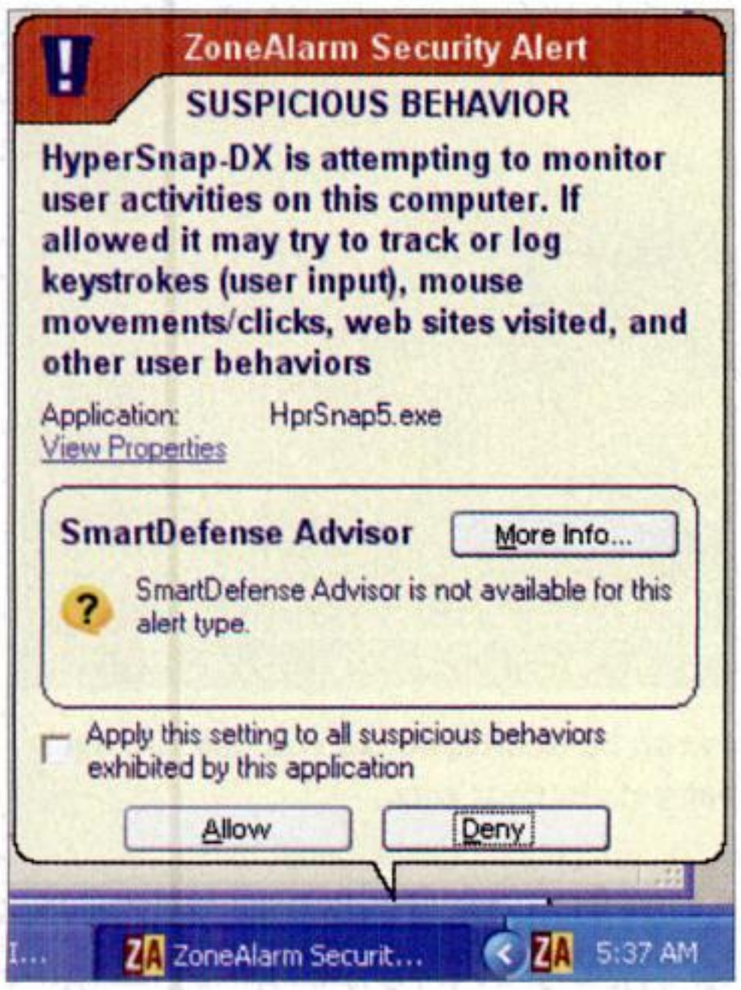
This latest iteration of *Zone Alarm*


ZoneAlarm Security Suite
ZONE
INTERNET
STOP
TRUSTED
Firewall
Overview
Firewall
Program Control
Anti-virus / Anti-spyware
E-mail Protection
Privacy
Identity Protection
IM Security
Parental Control
Alerts & Logs
The firewall protects you from dangerous traffic. It has three Zones.
Internet Zone: For protection from unknown computers.
Trusted Zone: For sharing with trusted computers.
Blocked Zone: For shutting out untrusted computers.
The Internet Zone contains all of the computers on the Web by default. Use the Zones tab to add computers to the Trusted or Blocked Zone.
Internet Zone Security
High
Stealth mode. Your computer is hidden and protected from hackers. Sharing is not allowed. This setting is recommended for the Internet Zone.
Trusted Zone Security
Med.
Medium: Sharing mode. Computers can see your computer and share its resources. This setting is recommended for the Trusted Zone only.
Blocked Zone Security
Blocked Zone
No communication is allowed through this Zone.

Although *ZoneAlarm* has evolved and expanded over the years, its unconventional but surprisingly effective user interface hasn't changed much at all.



The spyware scanner unearthed two bits of code left behind by long-uninstalled applications. Several other anti-spyware programs had failed to detect these applications.


ZoneAlarm Security Alert
SUSPICIOUS BEHAVIOR
HyperSnap-DX is attempting to monitor user activities on this computer. If allowed it may try to track or log keystrokes (user input), mouse movements/clicks, web sites visited, and other user behaviors
Application: HprSnap5.exe
View Properties
SmartDefense Advisor
More Info...
SmartDefense Advisor is not available for this alert type.
Apply this setting to all suspicious behaviors exhibited by this application
Allow
Deny
ZoneAlarm Securit...
5:37 AM

"SmartDefense Advisor" is supposed to distinguish genuine threats from the benign behavior of desirable software, but it has a propensity to label nearly everything as suspicious.

Security Suite offers thorough protection for your PC at a reasonable price. The program's better-safe-than-sorry alert messages will startle novices, but experienced users will take them in stride while customizing the program for their environment.

—MICHAEL BROWN

ZONEALARM SECURITY SUITE

9

+ INSTALLING A FIREWALL

Jam-packed with well-integrated security features.

– INSTALLING DRYWALL

Third-party credit-card protection is of dubious value.

$70, www.zonelabs.com

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Half-Life 2: Episode One

The best FPS of all time just keeps getting better

In *Episode One* you often have to depend on Alyx to help you in combat. Here we see her line up a sniper shot on these brain-munching zombies. Boom! Headshot!

This month we got to sample the first installment of what probably should have been called *Half-Life 3.* Though *Episode One* lacks the overall emotional impact of a 15-hour game, it's a fantastic, inventive shooter that's awesome from start to finish—albeit a little shorter than we'd like.

The episode begins right where *Half-Life 2* left off—you're in the Combine citadel in mortal peril. In a true deus ex machina, you and Alyx are miraculously rescued, and must escape from the crumbling City 17. The next five hours are a whirlwind of puzzle-solving, co-op combat with Alyx, and incredible battles that are as memorable as they are difficult.

The variety of new experiences in the game is splendid. The physics puzzles are much more fun and challenging this time around, and the fighting is as harried as ever, with several boss battles that are as explosive as a Michael Bay movie. The big focus this time around, however, is the interaction with Alyx, which Valve got just right. You're with her for 90 percent of *Episode One,* and she's never a bother. In fact, she's very helpful in combat, a reassuring presence (Valve's commentary track notes her role in praising the player), and has terrific dialogue that made us laugh out loud a few times. She's a genuine pleasure to be around, and in no way reminds us that we "can't leave without our buddy SuperFly," which is a *significant* achievement in FPS gaming.

The weapons are the same as in *Half-Life 2,* which is disappointing. Worse, there's only one new enemy—the Zombine—which is just a zombie Combine soldier. We were expecting at least a few new baddies, and maybe a new weapon or two.

There's still plenty of goodness to experience here, however, and even though it's "just" more *Half-Life 2,* we're OK with that, because *Half-Life 2* is pure FPS awesomeness. Episode One represents quality over quantity. While we would have loved more, we were satisfied with what we got for our $20.

—JOSH NOREM

HALF-LIFE 2: EPISODE ONE **9**

$20, www.half-life2.com, ESRB: M

MAXIMUM PC KICKASS

Auto Assault

A bit too simple, with too few players

Most game-world objects can be destroyed, so you can run over anything (and anyone) that gets in your way.

Medieval and fantasy MMORPGs are a dime a dozen these days, but not everyone is into wizards, orcs, and dragons. So along comes *Auto Assault:* an online MMO that breaks with the standard fantasy fare in favor of action-packed, post-apocalyptic car racing. It's an atypical MMO designed for people who don't enjoy the life-sucking time requirements of RPGs and, frankly, just want to blow stuff up. Sounds like fun, doesn't it?

You begin your adventure by allying yourself with one of three factions. Each faction offers four player classes: There's a combat-oriented commando, a healing-centric engineer, a support class, and a stealthy agent. This lack of diversity in character customization is disappointing—we like to be able to distinguish our characters from the others in MMO games.

You don't have to pay attention to the game's backstory to have fun; just pick up missions wherever you like and drive around the massive game world destroying baddies and collecting loot to your heart's content. Most missions involve destroying targets, collecting items, or scouting new areas. A helpful waypoint system and mini map prevent you from getting lost, and are especially welcome later on in the game when you have to drive long distances. Battling with NPCs makes for fast and furious fun. The combination of fast-paced driving, shooting, and destruction-derby-style carnage makes combat more than just a point-and-click affair. And there's no punishment if you die, so you're encouraged to go nuts.

Leveling up and finding new items is supposed to keep you coming back to the game. New weapons, armor, and power-ups can be acquired from quests, but eventually you have to rebuild and repair your car with components found around the game world. It can be difficult, however, to find other players who you can team up or trade with. While a dearth of players adds to the barren atmosphere of this game's desolate world, it belies the game's "massively multiplayer" status, and could ultimately be the kiss of death if subscriptions don't increase significantly.

—NORMAN CHAN

AUTO ASSAULT **7**

$50, www.autoassault.com, ERSB: T

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Hitman: Blood Money

Whacking people has never been this much fun

This couch potato obviously didn't see the reflection of an ominous bald man in his TV screen.

Assassination is a risky business (or so we're told), but as the saying goes, the bigger the risk, the sweeter the reward. And in *Hitman: Blood Money*, the tasks are difficult, but the rewards are oh, so delectable.

In the fourth installment of the popular *Hitman* series, you once again take up the garrote wire of the enigmatic Agent 47. Missions take you from the wetlands of Louisiana to the glittering lights of Sin City in pursuit of hapless perverts and politicians with the right price on their heads. And while we certainly take great pleasure in offing these scumbags, it's only because we know they're deserving of their fate.

The open-ended mission design that's been a hallmark of the series is back and has been nicely refined. Each of the game's 13 missions offers at least a dozen stylish ways of completing various goals and killing people. We injected doughnuts with poison, shot dogs with animal tranquilizer darts, and sabotaged circuit breakers to confuse guards, all in the same job! Not only does each level boast a ton of replayability because of the multitude of ways to complete a mission, but each one is littered with memorable gaming moments, including many classics. Stalking a man in a giant red bird costume through a dense crowd at Mardi Gras and crashing a Hell-themed dance orgy are experiences you won't soon forget.

Each mission is as hard as you want it to be. You must plan carefully to avoid killing innocents. Sneaking past guard patrols will give you a higher success rating, which translates into more money, which you can use for truly useful weapon upgrades. Reckless shooting also works, but you'll likely get your ass handed to you by the brutally smart AI. Our only complaints are that dragging bodies around is tedious, and some kill maneuvers take awhile, leaving you vulnerable.

An overarching plot ties the game together, but you don't have to follow it to get the gist of the story. And honestly, who cares? This game delivers the goods without a story, thanks to the vibrant levels and awesome gameplay. The icing on the cake is that it's not plagued by the control problems that mar other console ports.

HITMAN: BLOOD MONEY **9**

$40, www.hitmanbloodmoney.com, ESRB: M

Battlefield 2: Armored Fury

Three new maps bring back the Battlefield magic

Capturing a cloverleaf can be a substantial challenge, even if you have tons of tanks.

***Battlefield 2* won our 2005 Game Of The Year award for one simple reason—our entire game-playing staff was completely absorbed by the game for the second half of last year. After more than a year of regular play, however, Kubra Dam and Dalian Plant were getting a little tiring. That's where the *BF2* booster packs come in.**

Unlike full-blown expansions, which offer new weapons and tons of new content, the booster packs simply add a few new maps and vehicles to the basic *BF2* experience. *Euro Forces,* the first $10 booster pack to *Battlefied 2*, added a new European front in the form of three new maps, but they didn't see regular play on many servers. *Armored Fury* adds three damn-near-perfect new maps that focus on a North American invasion by aggressor nations.

The beauty of these new maps is that they place you in familiar suburban and rural locations within the U.S., and they focus heavily on open-field armored combat. Operation Road Rage is the fight for a key cloverleaf on an eastern Interstate. Operation Harvest places you in the rolling fields of Amish country, and Midnight Sun forces you to defend an Alaskan port against an invading force.

The focus on vehicular combat is immediately apparent. Between the flags you must capture and hold to win, there are wide-open fields. However, chokepoints abound, making it possible for infantry grunts to defend flags, while the heavy armor pushes forward on offense. These maps are well balanced and fun, and have earned spots alongside Sharqi Peninsula and Strike at Karkand as our favorites.

It's not all about the ground-pounders, though. The new scout choppers pack an infantry-killing punch, but are better used for their additional tricks. With seats for two passengers and the pilot—as well as a radar scan similar to the UAV drone—the small choppers let you move your men anywhere on the map in a hurry. The ground-attack planes, including the classic A-10 Warthog, are capable of shattering an armored column, but are vulnerable to the anti-air stations spread liberally throughout all three environments. On average, there's one AA placement per flag to give foot soldiers a better chance against air assets.

For anyone still playing *Battlefield 2,* these three maps are well worth your $10.

—WILL SMITH

BF2: ARMORED FURY **9**

$10, www.battlefield2.com, ESRB: T

MAXIMUM PC KICKASS

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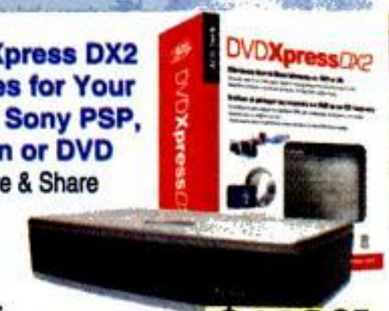

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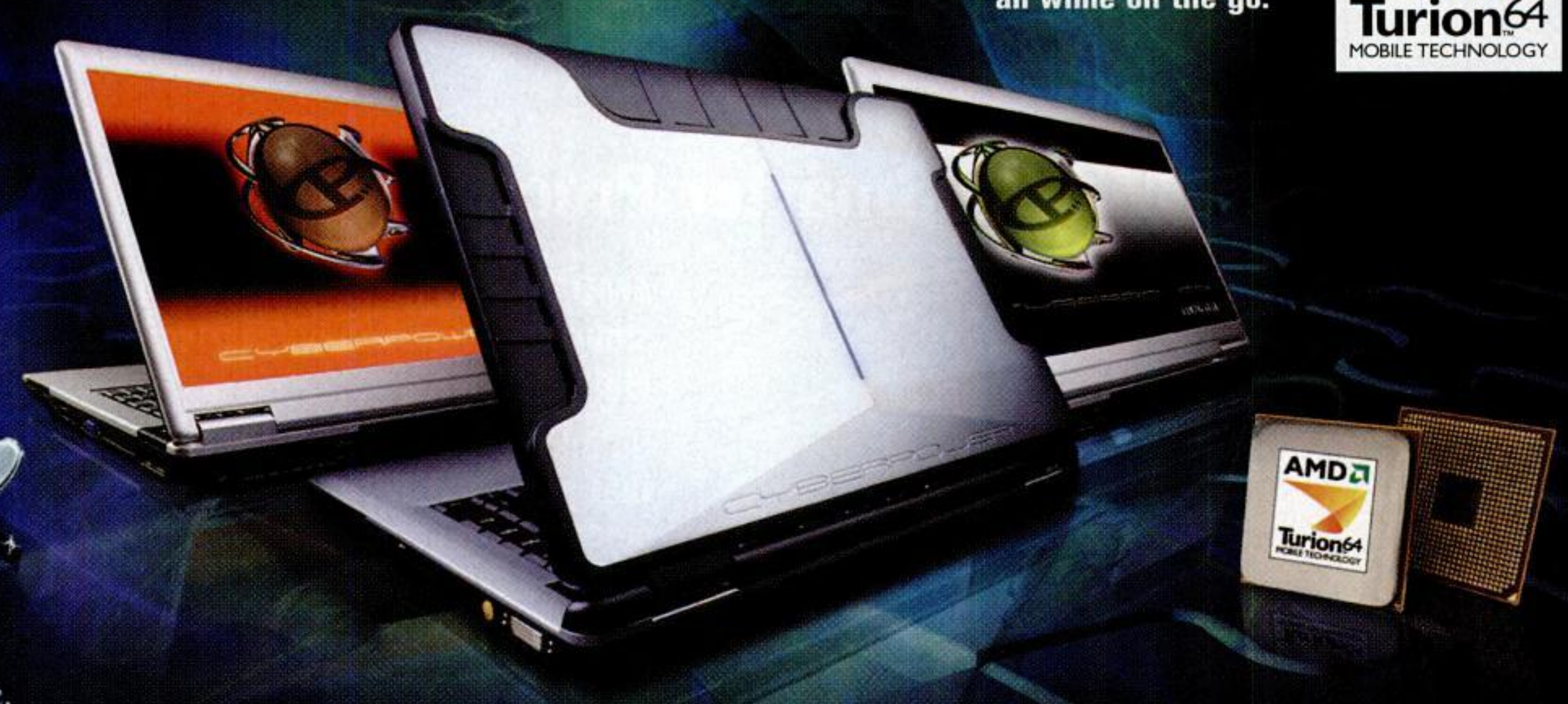

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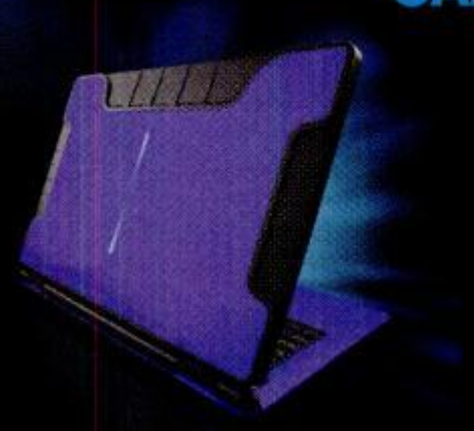

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- 10/100 Network Card & 56K V.92 Modem
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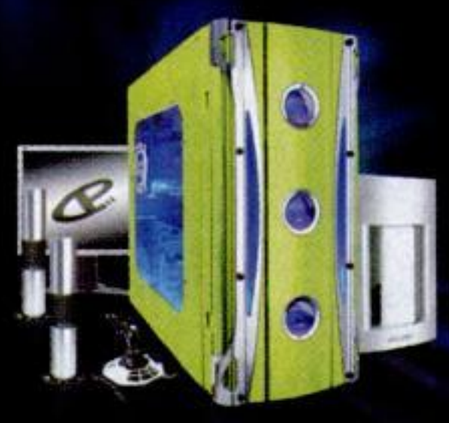

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AMD Athlon™ 64 X2 3800+ Processor	$ 845
AMD Athlon™ 64 3500+ Processor	$ 785

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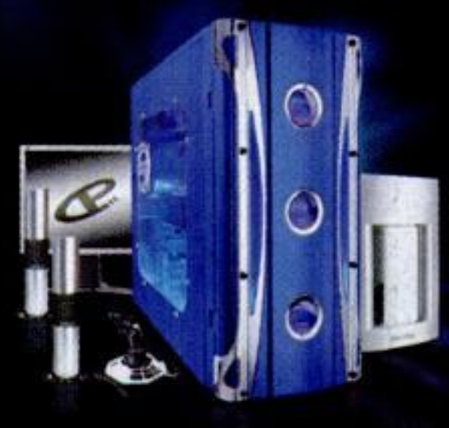

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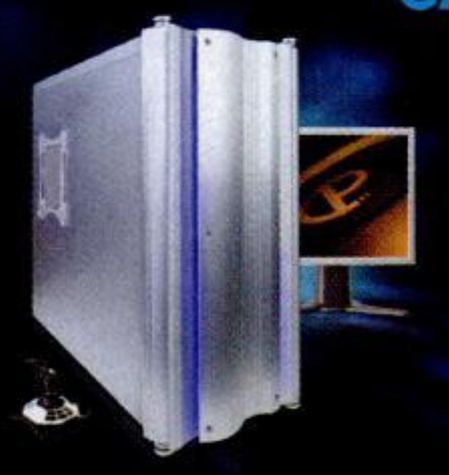

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AMD Athlon™ 64 X2 5000+ Processor	$ 1465
AMD Athlon™ 64 X2 4600+ Processor	$ 1356
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  Enhanced Virus Protection
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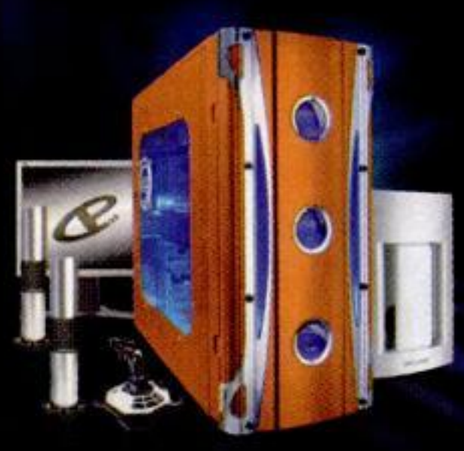

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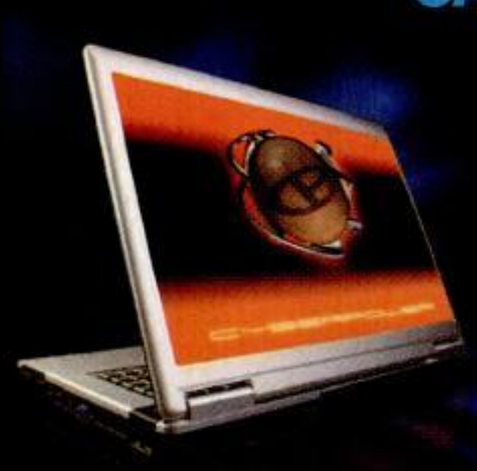

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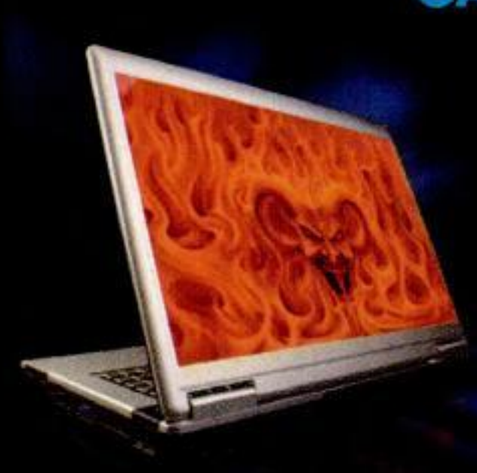

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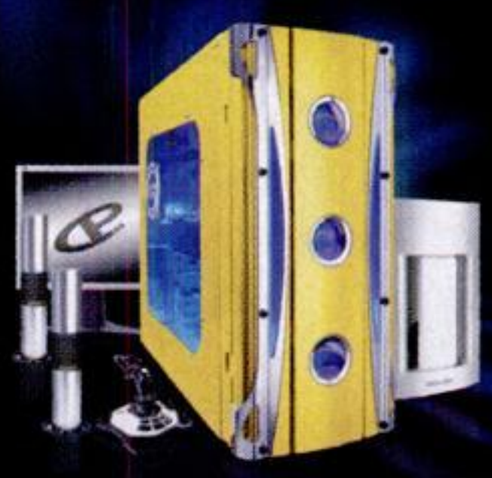

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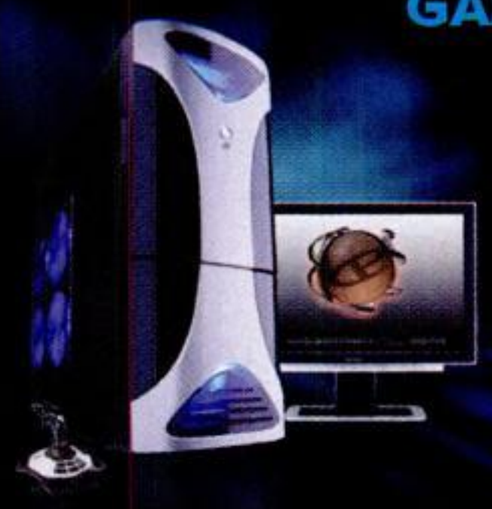

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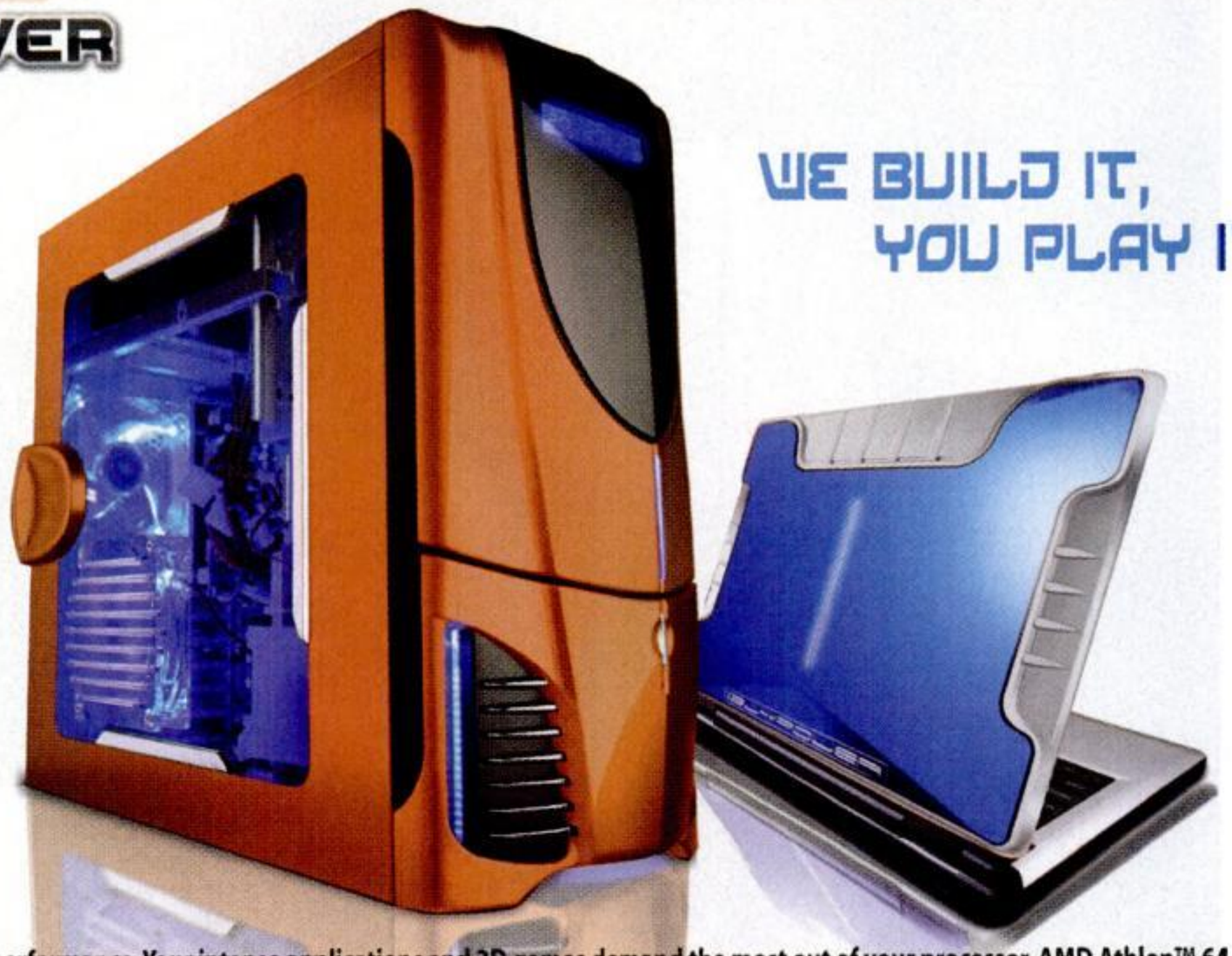

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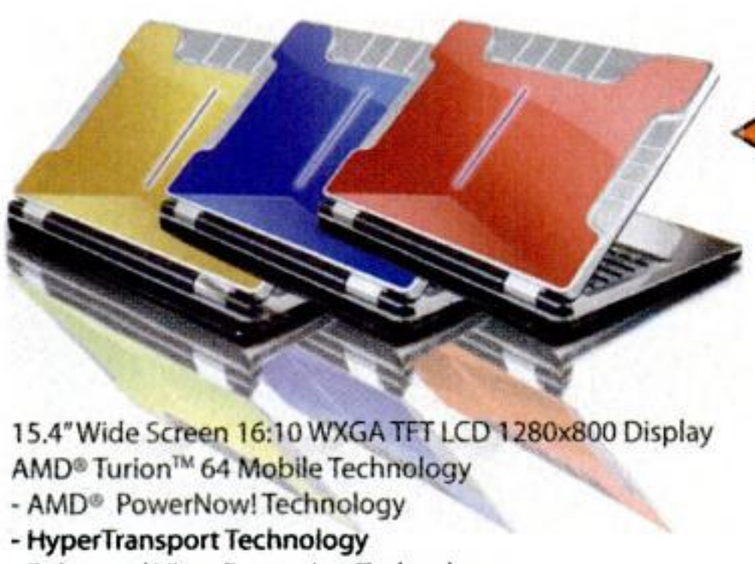

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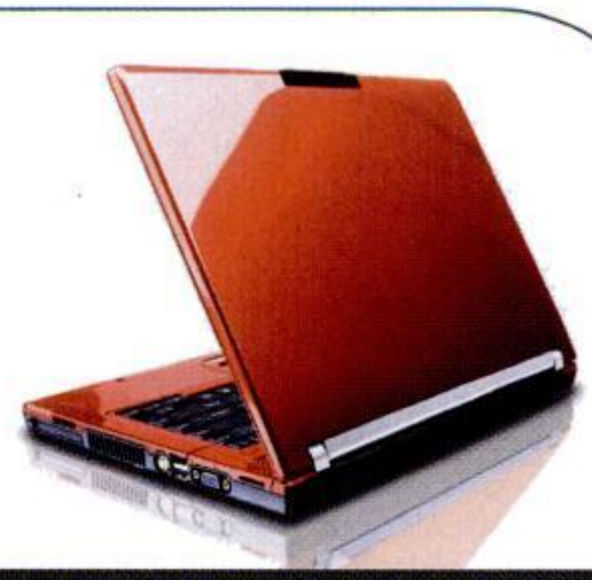

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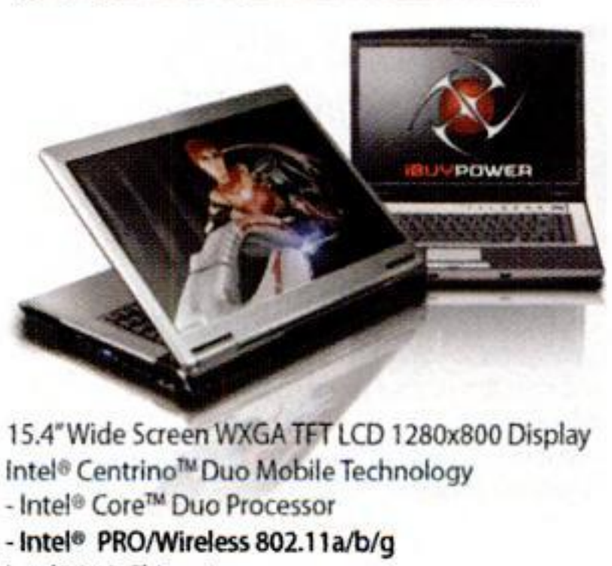

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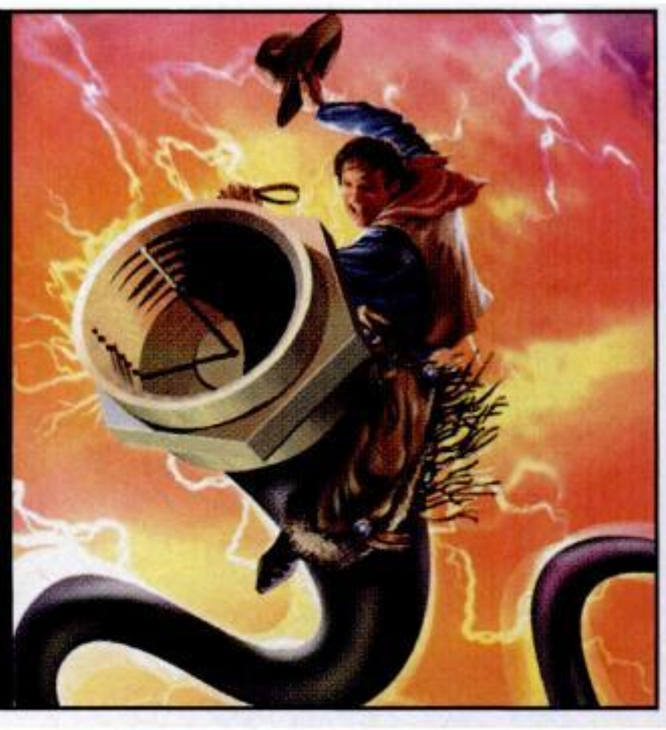

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SO WHAT'S STOPPING YOU?

TO ENTER: Your submission packet must contain your name, street address, and daytime phone number; no fewer than three high-res JPEGs (minimum size 1024x768) of your modified PC; and a 300-word description of what your PC represents and how it was modified. Emailed submissions should be sent to **rig@maximumpc.com.** Snail mail submissions should be sent to Rig of the Month, c/o Maximum PC, 4000 Shoreline Court, Suite 400, South San Francisco, CA 94080.

The judges will be *Maximum PC* editors, and they will base their decision on the following criteria: creativity and craftsmanship.

ONE ENTRY PER HOUSEHOLD. Your contest entry will be valid until (1) six months after its submission or (2) October 15, 2006, whichever date is earlier. Each month a winner will be chosen from the existing pool of valid entries, and featured in the Rig of the Month department of the magazine. The final winner in this contest will be announced in the January 2007 issue. Each of the judging criteria (creativity and craftsmanship) will be weighed equally at 50 percent. By entering this contest you agree that Future US, Inc. may use your name and your mod's likeness for promotional purposes without further payment. All prizes will be awarded and no minimum number of entries is required. Prizes won by minors will be awarded to their parents or legal guardians. Future US, Inc. is not responsible for damages or expenses that the winners might incur as a result of the Contest or the receipt of a prize, and winners are responsible for income taxes based on the value of the prize received. A list of winners may also be obtained by sending a stamped, self-addressed envelope to Future US, Inc. c/o Maximum PC Rig of the Month, 4000 Shoreline Ct, Suite 400, South San Francisco, CA 94080. This contest is limited to residents of the United States. No purchase necessary; void in Arizona, Maryland, Vermont, Puerto Rico, and where prohibited by law.

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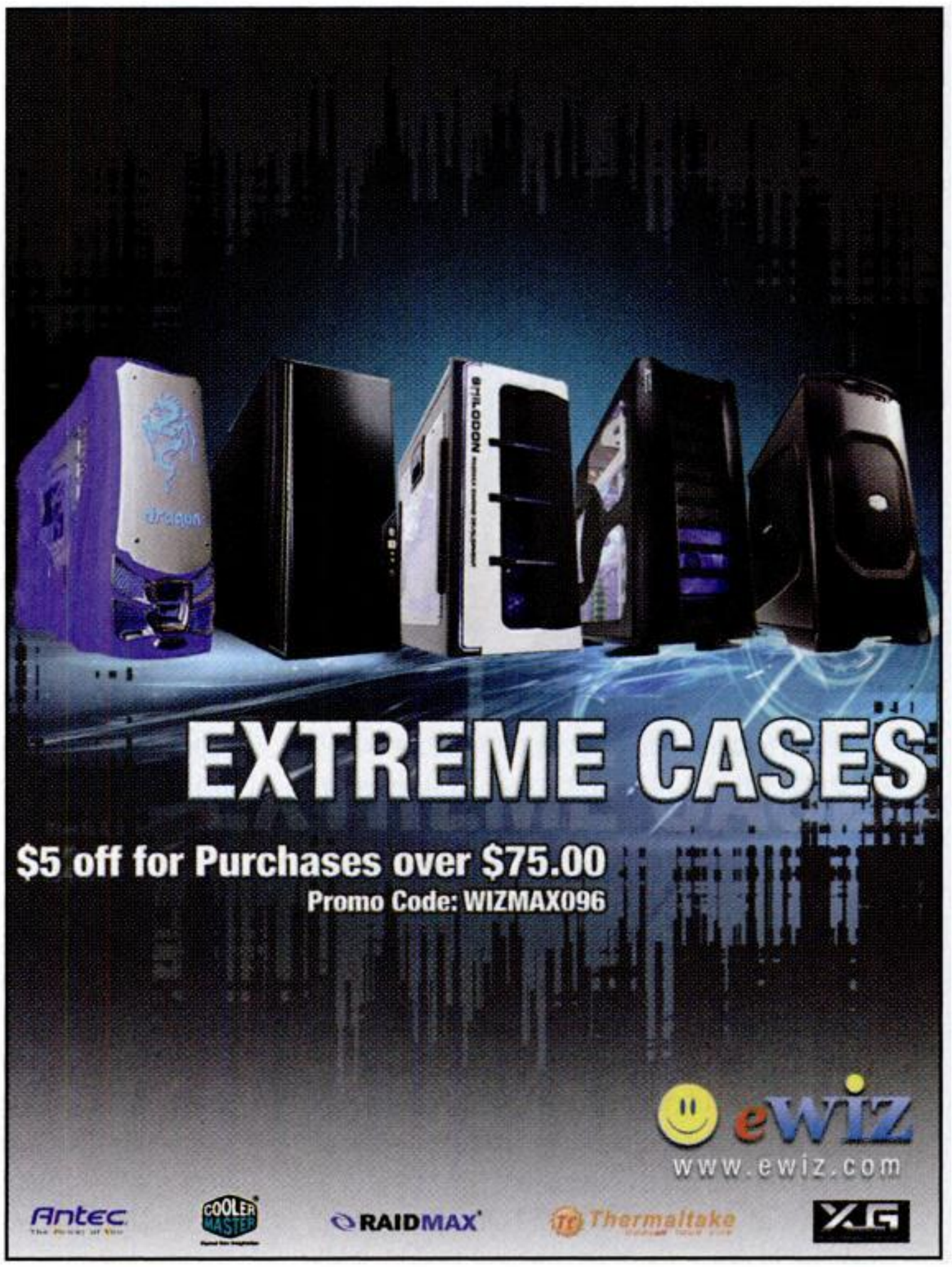

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We tackle tough reader questions on...

✓1MB L2 ✓Digital Deck ✓Net Neutrality ✓Workstation Graphics

512KB OF CACHE—MISSING!

I noticed that the AMD AM2 Athlon 64 X2 4400+ and Athlon 64 X2 4400+ CPUs are no longer being offered. Do you know what happened?

—Bob Guadagno

SENIOR EDITOR GORDON MAH UNG RESPONDS: AMD says it has axed all dual-core CPUs that feature 1MB of L2 cache (except for the FX and Opteron series) to "simplify" its roadmap. AMD says stores and retailers thought there were too many model numbers available and it was confusing the hell out of customers. There's also a rumor that AMD axed the 1MB chips because it needed to get more CPU cores out of each wafer. As you know, the larger the L2, the larger the die. The larger the die, the fewer cores yielded per wafer. What's the truth? We'd buy AMD's line except that the axe conveniently fell on only the large-cache chips. That seems mighty suspicious.

NEED MORE HDMI!

Thank you for reviewing the Digital Deck Media Connector (August 2005). I've tried to get more information about the product from the company but have not been successful.

You mentioned in the article that there is no HDTV support. Does that mean you cannot stream high-def files or that there is no HDMI or high-def connector? And, if you cannot stream HDTV recorded files, do you know of a product that does?

—Don Noble

EXECUTIVE EDITOR MICHAEL BROWN RESPONDS: The Digital Deck doesn't have any digital-video output, neither DVI nor HDMI. The device streams video by encoding it to MPEG-2 format at the receiving end, and decoding it at the delivery end.

The only streaming-video product equipped with an HDMI output was Thomson's Acoustic Research Digital Media Bridge (reviewed February 2006). Unfortunately, for reasons the company never explained to me, the product was pulled off the market. It's worth mentioning that you can stream HDTV files from a Windows Media Center 2005 machine to an Xbox 360; although the 360 doesn't include HDMI, it does feature component and VGA output options.

NET NEUTRALITY, PART DEUX

Tom Halfhill's "Fast Forward" column (June 2006) ignores the real issues at play with the battle for network neutrality. He failed to notice the three huge problems that erupt when the elephants of the Internet fight.

First, there is the dangerous possibility of exclusionary behavior. If your broadband ISP is partnered with MSN, for example, it could refuse to sell priority delivery to Google—at any price. Broadband companies who are divisions of content companies will especially love the new arrangement—they can hurt the competition and enhance their own products for free. A regulated market could control this problem, ensuring everyone has access to priority delivery at comparable rates, but it doesn't solve other problems.

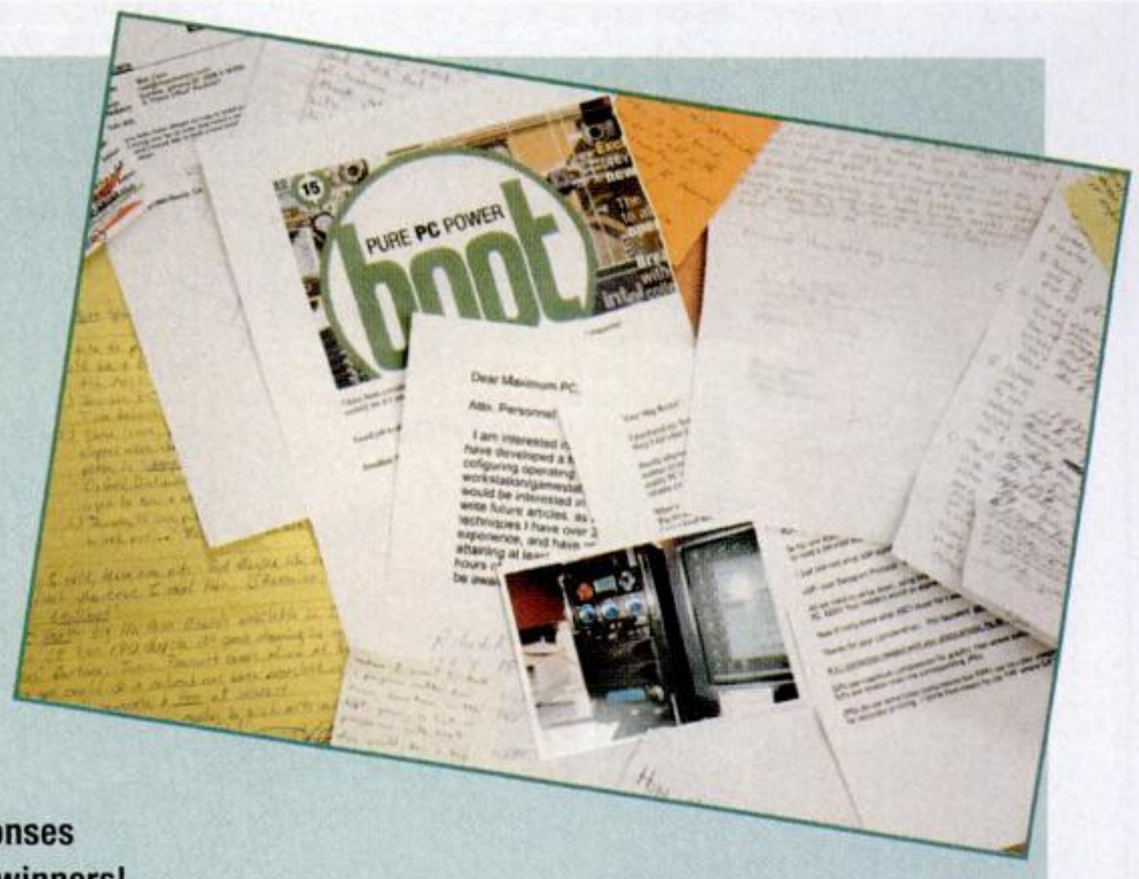
Priority also adds a significant level of complexity onto the network for content providers. Are your packets timing out because of a hardware failure, massive load, or because a provider somewhere along the way has decided to lower your packets' priority? Do you want to have to explain this to nontechnical customers?

Finally, artificial performance constraints add to the complexity of the broadband marketplace for customers. Now you not only need to compare throughput, reliability, and price, but also who has the best delivery relationships, which may change over time.

A non-neutral model makes sense in certain swaths of the market. Corporate or college networks could use priority with filtering policies, and users with specific quality-of-service needs could benefit from specialized services that offer priority. But home and small business broadband customers don't want to reshape their Internet usage to fit their provider's tastes.

—Jack Zeal

We Got Letters!



EDITOR IN CHIEF WILL SMITH WRITES: I just want to send out a big "Thank You" to all the folks who responded to our Reader Surveys in the January and April 2006 issues. We got several thousand responses and had a couple of lucky winners! Once we finish tabulating the results, we'll use them to improve *Maximum PC*, making it a magazine that more closely suits your tastes. An extra-special thanks to all the folks who included handwritten notes, pictures of their rigs, and other correspondence. We can't respond to all the letters, but we read every one. Thanks again!

CUTCOPYPASTE

►Our review of Logitech's Wireless Music System for PC in the July issue misstated the product's range, which is 330 feet.

►A news story in the August issue of *Maximum PC* incorrectly stated the L2 cache size and bus speed for Intel's midrange Core 2 Duo CPUs. The CPUs will feature 4MB of L2 cache and run on a 1066MHz front-side bus.

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CONTRIBUTING EDITOR TOM HALFHILL RESPONDS: Sorry, Jack, I don't buy your arguments for net neutrality. The exclusionary behavior you describe would almost certainly be ruled anti-competitive and doesn't happen in the marketplace today. For instance, FedEx owns Kinko's, and UPS owns Mail Boxes Etc., but both companies still deliver packages to each other's locations and customers in a timely fashion. What would happen if FedEx or UPS stopped delivering to recipients that have business relationships with competitors?

Your second argument falls apart because your scenario already happens. When a packet times out, for whatever reason, do you ever get an explanation? Right now, some packets get higher priority than yours, except the senders aren't paying for it. Suppose your email arrives late or not at all because Victoria's Secret staged an online event that hogged all of your provider's network bandwidth. Victoria's Secret didn't pay extra for that bandwidth. What is your recourse now?

Your third argument also describes today's Internet. The phone company could give DSL to everyone, not just those who pay for it. Isn't that an "artificial performance constraint"? Dial-up isn't slower just because DSL is faster. My monthly DSL fee pays for new equipment that adds bandwidth. The same will happen when Amazon, Google, Microsoft, Yahoo, Victoria's Secret, and other bandwidth hogs start paying their fair share for the resources they consume.

Should net neutrality come to pass, I predict that advocates will plead for tiered service in a few years. A single downloaded feature film may use more bandwidth than all the emails and text messages you will send in your lifetime. As the Internet chokes on multimedia streams requiring isochronous delivery, you will see the wisdom of charging users higher rates for heavier freight.

$2,000 GRAPHICS CARD?

I've been looking at quad-SLI systems, because I'm willing to pay anything to get the best 3D performance. However, I recently found an interesting-looking card on Pricewatch.com called the Wildcat Realizm 800. The specs look crazy (256GB virtual memory, dual GPUs, 3840x2400 resolution, and 640MB of GDDR3 memory). Is this board worth $2,000? Is it better than quad-SLI?

—MIKE BECK

EXECUTIVE EDITOR MICHAEL BROWN RESPONDS: It depends on what you want to use your videocard for. The Wildcat Realizm 800 is based on a 3DLabs GPU and is designed for accelerating workstation applications, such as AutoCAD and Maya. It should be compared to other workstation cards, such as ones based on nVidia's Quadro and ATI's FireGL GPUs. Comparing workstation cards to a GeForce quad SLI is comparing apples to oranges.

None of the workstation cards are well suited to games; some don't even include DirectX drivers. But if you're more interested in designing than playing, they're all worth a look.

PHYSICS FOLLOW-UP

While I'm disappointed to hear about the lackluster visual performance of the new PhysX card reviewed in the July issue, I have one question regarding the review. Supposedly, one of the benefits of the physics accelerators is that most or all of the physics processing work is offloaded from the CPU and handled by the physisc processor, in turn leading to faster performance. Did you test for a performance change? If so, what were the results? If not, would it be possible to include those results in future physics accelerator reviews?

—Matthew Snider

EXECUTIVE EDITOR MICHAEL BROWN RESPONDS: It's not easy to evaluate a piece of hardware when it establishes an entirely new market segment, and this difficulty is compounded when there's very little retail software designed to take advantage of it. It's like trying to measure the performance of new tires without the benefit of a car and a test track. So it wouldn't be fair to characterize the PhysX chip as having delivered "lackluster visual performance." With so few games available for testing, it's impossible to know whether the problem is inherently related to the processor, or if the software just did a poor job of leveraging the processor's abilities. When a real game running on the PhysX chip looks as good as the *Cell Factor* demo, we might have a different opinion of the chip.

As for offloading physics processing from the CPU, there's so little advanced physics in *Ghost Recon: Advanced Warfighter* that installing the PhysX card delivered an inconsequential boost in frame rate, in fact, we experienced the opposite. Because the graphics card is rendering many more objects, we actually experienced a slight, but noticeable slowdown in *GRAW*. And because *Cell Factor* runs only when the card is present, there's no way for us to make a comparison. MPC

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If Craig Tate's PC brings to mind an engine's guttural rumble, the screeching of tires, and the acrid taste of exhaust fumes, it's because his rig takes its cues from a 1969 BOSS 302 Ford Mustang—a muscle-car classic, if ever there was one. From the gloss-black powder-coated frame, to the vinyl striping, to the custom "hood" scoop (which functions as an air intake), Tate has spared no detail in constructing his hot rod. And like any self-respecting shade-tree mechanic, he has a list of additions and tweaks he still plans to make.

To make the scoop on the top of the case, Tate first laid down an aluminum base shape, covered it in aerosol insulation foam, cut and shaped the foam to the disired proportions, applied two layers of fiberglass, five layers of bondo, primer, and then paint. And "yes," he says, "it was a pain in the ass."

The grill on the exhaust fan began life as a wheel hub for a remote control car.

You're looking at the engine compartment, folks—complete with dual Gigabyte 6800 GT cards and an Athlon 64 FX-57 proc (nestled under that shiny automotive-grade air filter. Sweet.

Tate added a VU meter that shows wattage consumed to the front of the Cooler Master Centurion 531 case.

It's not the authentic Butterscotch Mustang paint, but OSHA Orange makes a fine subsitute.

For his winning entry, Craig Tate wins a $500 gift certificate for TigerDirect to fund his modding madness! See all the hardware deals at www.tigerdirect.com, and turn to page 108 for contest rules.

If you have a contender for Rig of the Month, e-mail **rig@maximumpc.com** with high-res digital pics and a 300-word write-up.

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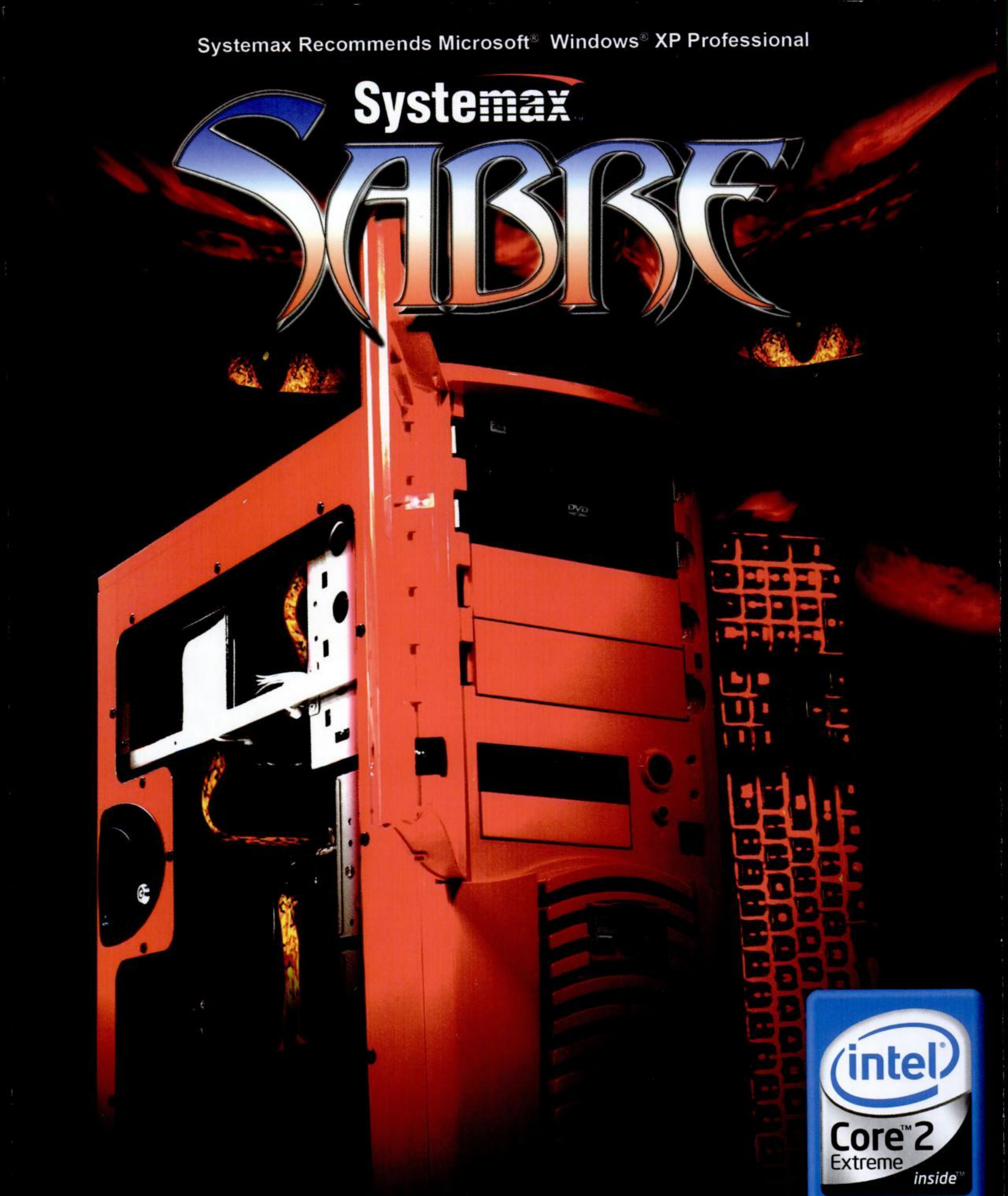

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